PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA

FOR

PROMOTING USEFUL KNOWLEDGE.

Vol. XXXIV,

JANUARY TO DECEMBER, 1895.

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VOL. XXXIV. JANUARY, 1895. No. 147.

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☞ It is requested that the receipt of this number be acknowledged.

☞ In order to secure prompt attention it is requested that all correspondence be addressed simply "To the Secretaries of the American Philosophical Society, 104 S. Fifth St., Philadelphia."

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BY

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EXTRACT FROM THE LAWS.

CHAPTER XII.

OF THE MAGELLANIC FUND.

SECTION 1. John Hyacinth de Magellan, in London, having in the year 1786 offered to the Society, as a donation, the sum of two hundred guineas, to be by them vested in a secure and permanent fund, to the end that the interest arising therefrom should be annually disposed of in premiums, to be adjudged by them to the author of the best discovery, or most useful invention, relating to Navigation, Astronomy, or Natural Philosophy (mere natural history only excepted); and the Society having accepted of the above donation, they hereby publish the conditions, prescribed by the donor and agreed to by the Society, upon which the said annual premiums will be awarded.

CONDITIONS OF THE MAGELLANIC PREMIUM.

1. The candidate shall send his discovery, invention or improvement, addressed to the President, or one of the Vice-Presidents of the Society, free of postage or other charges; and shall distinguish his performance by some motto, device, or other signature, at his pleasure. Together with his discovery, invention, or improvement, he shall also send a sealed letter containing the same motto, device, or signature, and subscribed with the real name and place of residence of the author.

2. Persons of any nation, sect or denomination whatever, shall be admitted as candidates for this premium.

3. No discovery, invention or improvement shall be entitled to this premium, which hath been already published, or for which the author hath been publicly rewarded elsewhere.

4. The candidate shall communicate his discovery, invention or improvement, either in the English, French, German, or Latin language.

5. All such communications shall be publicly read or exhibited to the Society at some stated meeting, not less than one month previous to the day of adjudication, and shall at all times be open to the inspection of such members as shall desire it. But no member shall carry home with

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Stated Meeting, January 4, 1895.

President, Mr. FRALEY, in the Chair.

Correspondence was submitted as follows:

Letters of resignation were received from Dr. George Strawbridge, Philadelphia; Prof. Isaac Sharpless, Haverford, Pa.

Accessions to the Library were reported from the Royal Asiatic Society (China Branch), Shanghai, China; Anthropological Society, Tokyo, Japan; Société de Géographie, Société Finno Ougrienne, Helsingfors, Finland; Société Physico-Mathématique, Kasan, Russia; Société de des Naturalistes de la Nouvelle Russie, Odessa; Académie Impériale des Sciences, St. Petersburg, Russia; Académie R. Suedoise des Sciences, Stockholm, Sweden; Académie R. des Sciences, Bruxelles, Belgique; Deutsche Seewarte, Hamburg, Germany; Bayerische Botanische Gesellschaft, Munich; Editors of *Il Nuovo Cimento*, Pisa, Italy; R. Accademia dei Lincei, Rome, Italy; Société des Sciences, Physiques, etc., Bordeaux, France; Académie des Sciences, Arts, etc., Dijon, France; Académie des Sciences, La Rochelle, France; Société d'Agriculture, Sciences, etc., Lyons, France; Société Languedocienne de Géographie, Montpellier, France; Société Francoise de Physique, Société de D'Enseignement, Société de Geographie, Rédaction de *Cosmos*, Marquis de Nadaillac, Paris, France; Société des Antiquaries de la Morenie, Saint Omer, France; Royal Society, Royal Astronomical Society, Editors of *Nature*,

Meteorological Office, London, Eng.; Geological Society, Manchester, Eng.; Harvard University, Cambridge, Mass.; Editor of the *Popular Science Monthly*, Hon. Charles P. Daly, New York, N. Y.; Department of State, Department of the Interior, Washington, D.C.; University of California, Sacramento.

The following death was announced:

Prof. James A. Rhoads, January 2, 1895, æt. 73.

On motion, the President was authorized to appoint a suitable person to prepare the usual obituary notice. Dr. Henry Hartshorne was subsequently appointed.

Reports of the Clerks and Judges of the election were read, and the report of the election was submitted:

President.

Frederick Fraley.

Vice-Presidents.

E. Otis Kendall, W. S. W. Ruschenberger, J. P. Lesley.

Secretaries.

George F. Barker, Daniel G. Brinton, Henry Phillips, Jr., George H. Horn.

Curators.

Patterson DuBois, J. Cheston Morris, Richard Meade Bache.

Treasurer.

J. Sergeant Price.

Councillors.

Richard Wood, William V. McKean, Richard Vaux, Henry Carey Baird.

Mr. J. G. Rosengarten read a paper entitled "The Paris Book Exhibition of 1894."

Prof. Cope spoke of the existence of man in Java in palæolithic times, drawn from the remains of skeletons found in volcanic strata.

Mr. Henry Phillips, Jr., was renominated for Librarian, and the nominations closed.

The amendments to the Laws were discussed.

Mr. Tatham moved the rejection of the part on reëlection. Lost.

Mr. Fraley explained the rules relating to the passage of amendments to the By-Laws.

Moved and seconded that further consideration of the By-Laws be postponed.

The report of the Finance Committee was presented, and the appropriations for the year were passed, a legal quorum of members being present.

And the Society was adjourned by the President.

Stated Meeting, January 18, 1895.

President, Mr. FRALEY, in the Chair.

Correspondence was submitted as follows:

Letter of resignation from Rev. G. W. Anderson, Rosemont, Pa.

Letter from Mr. Hoyt, to the President, in regard to a projected National University, was referred to the Secretaries with instructions to report.

Letters of envoy were received from the Geological Survey of India, Calcutta; Société de Géographie de Finlande, Helsingfors; Académie R. Suédoise des Sciences, Stockholm; K. Akademie der Wissenschaften, Vienna, Austria; R. Ministero della Istruzione Pubblica, Padova, Italia; Société des Sciences Physiques et Naturelles, Bordeaux, France; Faculté des Sciences, Marseille, France; Musée Guimet, École Polytechnique,

Bureau des Longitudes, Marquis de Nadaillac, Paris, France; Radcliffe Observatory, Oxford, England; Geological and Polytechnic Society, Yorkshire, England; Royal Irish Academy, Dublin; Dr. Don Estanislao S. Zeballos, Washington, D. C.

Letters of acknowledgment were received from the Société Imp. des Naturalistes, Moscow, Russia (139); Prof. J. Pomialowsky, St. Petersburg, Russia (144, 145); Académie Hongroise des Sciences, Budapest (142, 144, 145); Société R. de Géographie, Antwerp, Belgium (144); Musée R. d'Histoire Naturelle, Bibliotheque Royale de Belgique, Bruxelles (142, 144); K. K. Universitäts Sternwarte, Prague, Austria (142, 144, 145); Section für Naturkunde des O. T. C. (142, 144), Dr. Friedrich S. Krauss (145), Prof. J. Szombathy, Vienna, Austria (142, 144, 145); Naturforschende Gesellschaft des Osterlandes, Altenburg, Prussia (145); Gesellschaft für Erdkunde, Berlin, Prussia (145); K. Universitäts-Bibliothek, Bonn, Prussia (142, 144, 145); K. Sächs. Meteorologische Institut, Chemnitz, Saxony (145); Verein für Erdkunde, Dresden, Saxony (142, 144); Oberhessische Gesellschaft für Natur- und Heilkunde, Giessen, Germany (142, 144, 145); K. Gesellschaft der Wissenschaften, Göttingen, Prussia (142, 144, 145); K. Leopoldinische Carolinische Akademie, Halle a. S., Prussia (145); Wetterauische Gesellschaft, Hanau, Germany (144); Vogtländische Altertumsforschende Verein, Hohenleuben, Saxony (142, 144, 145); Mr. O. Böhtlingk (145), Prof. I. Victor Carus, Leipzig, Saxony (144, 145); K. Sternwarte, Munich, Bavaria (145); Prof. G. Sergi, Rome, Italy (144); R. Accademia delle Scienze, Turin, Italy (142); Société Linnéenne, Bordeaux, France (145); Société des Sciences Naturelles et Archéologique de la Creuse, Guéret, France (144); Société d'Agriculture et d'Histoire Naturelle, Lyon, France (130, 140); Musée Guimet, Dr. Edward Pepper, Paris, France (145); Sir John Evans, Hemel Hempstead, England (145); Mr. Juhlin Dannfeld, Col. William Ludlow, London, England (145); Geographical Society, Manchester, England (145); Natural History Society of Northumberland,

etc., Newcastle-on-Tyne, England (145); Royal Geological Society of Cornwall, Penzance, England (145); Society of Natural History, Boston, Mass. (*Trans.*, xvii, 3, and xviii, 1); American Academy of Medicine, Easton, Pa. (144, 145); Newberry Library, Chicago, Ill. (144, 145).

Accessions to the Library were reported from the Geological Survey of India, Calcutta; Société Imp. Russe de Géographie, St. Petersburg; Nederlandsche Maatschappij ter bevordering van Nijverheid, Amsterdam; Société Hollandaise des Sciences, Harlem; Maatschappij der Nederlandsche Letterkunde, Leiden, Z. Holland; Académie des Sciences, Cracow, Austria; Naturhistorische Landes-Museum von Kärnten, Klagenfurt, Austria; Gesellschaft für Erdkunde, Berlin, Prussia; Naturwissenschaftliche Gesellschaft, Chemnitz, Saxony; Oberlausitzische Gesellschaft der Wissenschaften, Görlitz, Prussia; Verein für Erdkunde, Halle a. S., Prussia; Verein für Lübeckische Geschichte und Alterthumskunde, Lübeck, Germany; Deutsche Gesellschaft für Anthropologie, Ethnologie, etc., Munich, Bavaria; Geographische Gesellschaft, Bern, Switzerland; Biblioteca N. C., Firenze, Italia; Société de Geographie, Lille, France; Directeur de *Melusine*, Bureau des Longitudes, Paris, France; R. Academia de la Historia, Madrid, Spain; Society of Arts, R. Geographical Society, Editors of the *Geological Magazine*, London, England; Natural History Society, Newcastle-on-Tyne, England; Royal Irish Academy, Dublin; American Statistical Association, Commissioner of Public Records, Athenæum, Mass. Institute of Technology, Mass. Historical Society, Mr. Robert C. Winthrop, Jr., Boston, Mass.; Museum of Comparative Zoölogy, Harvard College, Cambridge, Mass.; R. I. Historical Society, Providence; Travelers' Insurance Co., Hartford, Conn.; Editors of the *American Journal of Science*, Yale University, New Haven, Conn.; Brooklyn Library, Brooklyn, N. Y.; Hamilton College, Clinton, N. Y.; Meteorological Observatory, New York, N. Y.; Mr. William John Potts, Camden, N. J.; College of New Jersey, Princeton; American Chemical Society, Easton, Pa.; Franklin Institute, College of Pharmacy, Dr. Walter M.

James, Messrs. Willis G. Aale, Henry Phillips, Jr., Philadelphia; Johns Hopkins University, Editor of the *American Chemical Journal*, Baltimore, Md.; Agricultural Experiment Stations, Burlington, Vt., Kingston, R. I., Geneva, N. Y., Ithaca, N. Y., State College, Pa.

A framed phototype of the State House was received from Mr. F. Gutekunst, Philadelphia.

Henry Phillips, Jr., was unanimously reëlected Librarian of the Society for the ensuing year.

A quorum not being present, no action was taken on the proposed amendments to the By-Laws.

The appointment of the Standing Committees was referred to the President to take action and report on before the next meeting.

Prof. Cope read observations on "Prof. Hæckel's Confession of Faith."

Questions were asked, and comments made by Mr. Ingham and Dr. Morris.

Nominations 1302 to 1305 were read.

And the Society was adjourned by the President.

Stated Meeting, February 1, 1895.

Treasurer, Mr. PRICE, in the Chair.

Minutes of last meeting were read and approved.

Correspondence was submitted as follows:

Letters of envoy were received from the Maatschappij der Nederlandsche Letterkunde, Leiden, Z. Holland; Naturwissenschaftliche Gesellschaft, Chemnitz, Saxony; Oficina Meteorológica Argentina, Cordoba, Argentine Republic.

Letters of acknowledgment were received from the Linnean Society of N. South Wales, Sydney (142, 144); Prof. O. Donner, Helsingfors, Finland (144, 145); Dr. Herman Snellen, Jr., Utrecht, Netherlands (144); Academie des Sciences, Cra-

cow, Austria (142, 144, 145); Naturforschende Gesellschaft, Emden, Prussia (142, 144, 145); K. Geodätisches Institut, Potsdam, Prussia (144, 145); M. A. Des Cloizeaux, Paris, France (145); Prof. J. P. Postgate, Cambridge, England, Royal Observatory, Edinburgh, Scotland (145); University of Nebraska, Lincoln (96–139).

Accessions to the Library were reported from Comité des Conservation des Monuments de l'Art Arabe, Cairo, Egypt; Ministerie van Kolonien, Batavia, Java; Hollandsche Maatschappij van Wetenschappen, Haarlem; Minister of International Affairs, The Hague, Netherlands; Société Hongroise de Géographie, Budapest; K. K. Geologische Reichsanstalt, Vienna, Austria; Aachener Geschichtsverein, Aachen, Prussia; Deutsche Geologische Gesellschaft, K. Geodätische Institut, Physiologische Gesellschaft, Messrs. R. Friedländer & Sohn, Berlin, Prussia; Gartenbauverein, Darmstadt, Germany; Prof. Dr. Ernest Hæckel, Jena, Germany; Ministero di Agricoltura Industria e Commercio, Rome, Italy; Philological Society, Cambridge, England; R. Microscopical Society, London, England; Literary and Philosophical Society, Manchester, England; American Geographical Society, American Mathematical Society, Scientific Alliance, New York, N. Y.; Hydrographic Office, Engineers' Club, Editor of the *Naturalist's Leisure Hour*, Mr. William H. Rau, Philadelphia; U. S. Departments of the Interior, Labor, War, and Agriculture, Anthropological Society, U. S. Civil Service Commission, Prof. James C. Pilling, Washington, D. C.; Elisha Mitchell Scientific Society, Chapel Hill, N. C.; Editors of the *Journal of Comparative Neurology*, Granville, O.; State Board of Health, Nashville, Tenn.; Missouri Historical Society, St. Louis; Historical Society, Field Columbian Museum, Chicago, Ill.; State Historical Society, Iowa City, Iowa; Geological and Natural History Survey, Minneapolis, Minn.; University of Nebraska, Historical Society, Lincoln, Neb.; Editor of *El Instructor*, Dr. Jesus Diaz de Léon, Aquascalientes, Mex.; Asociacion de Ingenieros y Arquetectos, Mexico, Mex.; Oficina Meteorológica Argentina, Dr. Don Estanislao S. Zeballos,

Buenos Aires, Argentine Republic; Observatorio do Rio Janeiro, Brazil; Agricultural Experiment Stations: Blacksburg, Va., Raleigh, N. C., Uniontown, Ala., Baton Rouge, La., Knoxville, Tenn., Fayetteville, Ark., Columbia, Mo., State College, Mich., Lafayette, Ind., Berkeley, Cal., St. Anthony Park, Minn., Las Cruces, N. Mex.

A paper was read by Mr. Julius F. Sachse, on the "Horologium Achaz."

Remarks were made by Dr. Horn and Dr. Brinton.

A paper was read by Mr. Lorin Blodget on "The Scope and Importance of Electricity as a Motor."

Pending nominations 1302 to 1305 were read.

The Committee on Indexing was discharged.

Dr. Frazer made a communication on the necessity of the unification of methods employed by experts for the purpose of detecting forgery, and ascertaining the character of handwriting.

Dr. Frazer moved that a committee, composed of Dr. Frazer and Mr. S. P. Sharples, be appointed to report on the general subject of methods useful in the investigation of documents; and that said Committee have power to associate with their number, other specialists who are not members of the Society.

And the Society was adjourned by the presiding member.

Stated Meeting, February 15, 1895.

President, Mr. FRALEY, in the Chair.

Present, 31 members.

Correspondence was submitted as follows:

Letters of envoy were received from the Royal Statistical Society, London, England; Chief Engineer and Superintendent of Fairmount Park, Philadelphia; Smithsonian Institution, Washington, D. C.

Letters of acknowledgment from the Comité Géologique, St. Petersburg, Russia (144, 145); K. D. Videnskabernes

Selskab, Copenhagen, Denmark (144); Physikalische Gesellschaft, Berlin, Prussia (144, 145); Marquis Antonio di Gregorio, Palermo, Italy (144); Bibliothèque Universitaire, Lyon, France (145).

Accessions to the Library were reported from the Académie R. des Sciences, etc., de Denmark, Copenhagen; R. Statistika Central Byrån, Stockholm, Sweden; Section für Naturkunde des Ö. T. C., Vienna, Austria; Naturforschende Gesellschaft, Zürich, Switzerland; Società Toscana di Scienze Naturali, Pisa; Geological Society, R. Geographical Society, Editor of the *Geological Magazine*, Royal Statistical Society, London, England; Amer. Institute of Electrical Engineers, Astor Library, New York, N. Y.; Board of Public Charities and Committee on Lunacy, Historical Society of Pennsylvania, Pennsylvania Forestry Association, Mr. Samuel Wagner, Philadelphia; Fish Commission, U. S. Bureau of Education, Smithsonian Institution, Bureau of the Mint, Washington, D. C.

The stated business of the meeting being the election of members, Secretaries Barker and Horn were appointed by the President as Tellers.

The President announced that he had reappointed the Standing Committees of 1894 to act in the current year.

Mr. Price, from the Committee on the Henry M. Phillips Prize Essay Fund, reported that a circular had been sent out on May 1, 1893, setting forth the object of the foundation of the Prize, and requesting that the essays to be written be placed in the hands of the Society by January 1, 1895. That before that date eight essays had been received by the Society, all in conformity with the regulations adopted by the Committee. The Committee presents the names of the following ten gentlemen as a "Committee of Judges," from whom five names shall be selected by the Society:

James C. Carter,	D. C. Langdell,
Edward J. Phelps,	Francis Wayland,
J. Randolph Tucker,	William A. Keever,
Courtland Parker,	Henry Billings Brown,
C. Stuart Patterson,	W. Pinckney Whyte.

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The matter having been considered by the Society, on motion, the following-named five gentlemen were unanimously selected as a "Committee of Judges," and the acting Secretary of the Prize Essay Committee was directed to inform them of their appointment by letter to be signed by Mr. Fraley, President of the Society:

James C. Carter, of New York,
Edward J. Phelps, of Vermont,
J. Randolph Tucker, of Virginia,
Courtland Parker, of New Jersey,
C. Stuart Patterson, of Pennsylvania.

A recess was taken, in order to give members an opportunity to cast their ballots.

After recess, the proposed amendments to the By-Laws were taken up.

Dr. J. Cheston Morris raised the point of order that proper publication of the proposed consideration of the By-Laws had not been made.

It having been shown that the Secretary acting at the time had officially reported such publication had been made, the point of order was overruled.

Mr. Prime moved that the Society proceed to the consideration of the amendments to the By-Laws at this time.

The motion was recorded, and a division having been called, it was lost.

Mr. Prime then moved to indefinitely postpone the consideration of the amendments. Carried.

Dr. Greene, inquired whether, by purchase or exchange, he could obtain some odd numbers of the *Quarterly Journal of the Chemical Society*, now in the library of the Society.

On motion, the application was referred to the Committee on Library, with power to act.

Dr. Minis Hays moved to reconsider the motion by which the Society had refused to consider, at this time, the proposed amendments to the By-Laws. Carried.

Mr. Prime moved that the Committee on the proposed

amendments be discharged, and that the consideration of the amendments be indefinitely postponed. Seconded and carried.

The Tellers having announced that their report on the balloting for candidates was ready, the President instructed them to present it. The report declared the following persons duly elected members:

2231. Prof. Alpheus Hyatt, Cambridge, Mass.
2232. Prof. W. W. Goodwin, Cambridge, Mass.
2233. R. F. Glaizebrook, F.R.S., Cambridge, England.
2234. C. A. M. Fennell, Litt.D., Cambridge, England.
2235. Prince Roland Bonaparte, Paris, France.
2236. A. Wallis Budge, Litt.D., London, England.
2237. Hon. James Bryce, M.P., London, England.
2238. Sir George Grove, D.C.L., London, England.
2239. William Huggins, D.C.L., London, England.
2240. James Glaisher, F.R.S., Edinburgh, Scotland.
2241. Rev. James Legge, LL.D., Oxford, England.
2242. Gabriel de Mortillet, St. Germain-en Laye, France.
2243. Rev. Isaac Taylor, LL.D., York, England.
2244. Prof. William Wundt, Leipzic, Germany.
2245. Dr. Ernst Curtius, Berlin, Prussia.
2246. Charles C. Harrison, Philadelphia.
2247. Richard A. Cleemann, M.D., Philadelphia.
2248. Richard Stockton Hunter, Philadelphia.
2249. Charlemagne Tower, Philadelphia.
2250. Joseph Wilcox, Philadelphia.
2251. Henry C. Mercer, Doylestown, Pa.
2252. Le Marquis Achille de Rochambeau, Rochambeau, France.

Reading of the rough minutes was dispensed with, and the Society was adjourned by the President.

The Paris Book Exhibition of 1894.

By J. G. Rosengarten.

(*Read before the American Philosophical Society, January 4, 1895.*)

The November-December number of the Paris *Bulletin du Bibliophile* contains exhaustive notices of the "Exposition du Livre," opened at the Palais de l'Industrie, in Paris, during the summer of 1894. To those who had the good fortune to see this wealth of illustrations of the whole history of books in France, these notices are most useful, for there was no catalogue to guide the visitor through the vast space filled with the treasures of the collectors of Paris. To those who knew of the exhibition only from brief newspaper notices, it may be of interest to learn something of its extent and importance.

It had special significance in its fine examples of typography, illustration and bookbinding, but besides these, it had original drawings and engravings, and an almost endless variety of rarities—a whole history of the making of paper and its uses, a complete series of assignats, and great numbers of old specimens of mercantile paper, bills, drafts, shares of stock, stamped papers from the time of Louis XIV to our own, playing cards of every country—a whole series from China for instance—fans, invitations to dinners, fêtes and other entertainments, public and private, notices of service in the National Guard, visiting cards, not the commonplace pasteboard of to-day, but rich in vignettes and other ornamental illustration. There was a wealth of theatrical and other posters, in which the French led the way for an artistic development that has since spread all around the world. Autograph letters and documents, dating back for the last three centuries, were displayed in great profusion, under the title of "graphology." A whole series of papers showing the papermakers' marks, for a long series of years, was quite an important contribution.

The newspaper collection was very large, from the *Gazette de France*, founded in 1631, through the whole history of French periodicals. A number of *L'Ami du Peuple*, much discolored, is said to be the very copy in the hand of Marat, and stained with his blood when he was stabbed in his bath by Charlotte Corday. There were all the illustrated journals and newspapers so characteristic of French taste.

There was a large collection of ornamental letters and other typographical ornaments of the printers of the sixteenth and seventeenth centuries, their catalogues, the decrees of Parliament ordering the destruction of condemned books and the punishment of the book peddlers who offered them for sale. There were whole series of printed books and very striking examples of bookbinding, engraving, typography, from the very outset to our own day, the bad and indifferent as characteristic as the good and the best. There was a fragment of the *Biblia Pauperum*,

xylographic work preceding the discovery of movable types. There were beautiful *incunabula*, works printed before 1500, and fine examples of printing of the sixteenth century, when all the problems of typography were already solved, black, brilliant, unalterable ink, paper often uneven but strong enough to resist use and wear all these years, type perfectly clear and extremely beautiful, illustrations of great artists, refined in execution, in exquisite taste; wood engravings in harmony with the text, yet all these were done with imperfect mechanical appliances, but much better done than the work of our own day with all the help of machinery carried to the highest perfection.

Then came the Elzevirs with their attractive books, and a whole series of printers of irreproachable correctness, charming simplicity and a noble air worthy of the books they issued from their presses. Publishers and printers alike were then men of knowledge, masters of the classical languages, writing Latin and reading Greek. Later on, as books increased in numbers, they lost in their typographical value; a few printers fought for the old standards of excellence, but they were driven from the field, and even when the art of illustration was at its best, the printing and paper were at their worst.

The nineteenth century has seen a still greater divorce between the good and the bad. Many books well printed and illustrated are made of wretched paper. That used in the *incunabula* has stood four centuries of hard usage without harm. That used in some of the books printed in this century of ours has not lasted for forty years. Typography was an art in the fifteenth and sixteenth centuries; to-day it is an art with and for the few, an industry with and for the many. It is carried on in vast establishments that have little in common with the old printing office, so admirably preserved in the Plantin Museum of Antwerp, and so well reproduced in Flameng's picture of Grolier's visit to the Aldine printing office in Venice, some cases full of type, some forms ready, a press on the model of the old wine presses, from which the name was derived. Nowadays there would be a great manufacturing establishment with machinery driven by steam or electricity, where printing is done with the best mechanical appliances.

At the Exposition there was a whole series of such machinery in use to-day. It is only to be regretted that there was not a retrospective exhibition, from the old hand press, the first steam press, that of the *Times* of 1814, when the announcement was proudly made that that paper was printed by steam—very primitive it was, too—printed on one side at a time. By 1834 there were 160 steam presses in use in France. By 1847 there was in use in Paris a steam press with four cylinders printing both sides at once, for the first time. In 1866, rotary presses were introduced, and in 1873 an endless printing press was first used in Paris. In 1878, there was exhibited a press printing 40,000 copies an hour, and cutting, counting, folding, all done by machinery. Since then printing in colors, photogravure, photolithography, and many other applications of the

sister arts have been added to the daily use of the printing office, and every day sees the announcement of some new handmaid to the old art preservative of all arts.

The cheapening of books has gone hand in hand with the improvements in typography and its allied arts, but at the same time books dear to the bibliophile are still being produced, and the last decade of the century, now fast drawing to its end, will leave to posterity a rich heritage of works representing splendidly all the forms of expression of art in books. The renaissance of making fine books is comparatively modern ; at one time it was limited to mere reproduction, but now it is marked by progressive originality, sometimes like the impressionists in painting startling by their struggles for novelty, but often charming by the good use made of the latest mechanical inventions. The French publishers have succeeded in making each a specialty, and the great books on architecture and decoration, the Bibles, the classic French authors, on art and on bibliography, will perpetuate their names among the world's master printers.

The Exposition du Livre was rich in typography, but it was also rich in illustrations of every epoch and every kind. The oldest illustrators were the miniaturists and illuminators of the Middle Ages. It is in the manuscripts anterior to the discovery of Guttenburg that their art can be best appreciated. One of the rooms on the lower floor of the Palais de l'Industrie was devoted to manuscripts, and many of them were rare marvels of beauty, all of real interest. Printing by the end of the fifteenth century supplanted manuscripts and illumination, an art that has only been revived in our own day. The learned chief of the famous Museum of the Louvre has told the sad story of a miniature painter for manuscripts, who after holding rank at the head of the Guild, saw his talent made useless in competition with the first printers, and he soon lost his occupation and the means of his livelihood. The old art was killed, but it had the honor of compelling its new rivals to imitate the work of their predecessors. In the best *incunabula* there is a constant effort to make the printed page look like manuscript. The decoration of the printed *Livres d'Heures* strove to imitate the models which scribes had carried to a rare degree of perfection. They were works of art and luxury, and do honor to the names of Vérard and Pigouchet, Kerver and Simon Vostre. Under the influence of Italian renaissance they worked a great change, visible in the books of the sixteenth century, with their large plates illustrating the text, the borders surrounding, the figures inserted in the pages. The designers and the engravers were artists of the first excellence.

The next age, that of the great masters of French literature, was too busy with the text to care for illustration, beyond an allegorical frontispiece or portraits, such as that of Malherbe in the edition of 1630, or of Corneille in that of 1644, excellent examples of engraving and valuable historically. In religious books and in funeral orations there were still illustrations. The funeral sermons of the seventeenth century were not

only great masterpieces of pulpit eloquence, such as Bossuet's immortal sermons, but they were printed with noble and serious splendor. The great period of illustrated books was that of the eighteenth century, and it was at its best from 1750 to 1780. The poorest volumes had exquisite vignettes, and worthless verse or prose was made attractive by the capital illustrations, and a wit of the time said that the *beaux esprits* were like shipwrecked mariners, "ils se sont sauvés par les planches." The school of French illustrators of that time, with its traditions, its discipline, its great artists, each with his own style, yet all full of unity in their collective work, really illustrative of the text, was admirably exhibited. With the troubled times of the French Revolution, art too declined, but it revived with the romanticism of our own century, and showed thoroughly French liveliness. Then, after Meissonier and other really great masters, came a new eclipse, from 1850 to 1870, when Gustave Doré was the only famous name, his powerful inventive genius and his extreme abundance of work marred by careless execution. With 1870 began a new period of works of art and luxury. Many of them have already passed into oblivion or that abyss of second-hand stalls and low prices that properly mark their real value or valuelessness, but there remains a wealth of really good work. Many of the original drawings by the best artists were in the exhibition, and not only their designs for books, but for fans, posters and advertisements. The engravers on wood, too, were there, and the original designs from many famous hands were placed alongside the reproductions, to show how much credit belongs to the engraver, and the perfection of the typographic and other processes, both in black and white and in colors. Even in photographic illustrations there was evidence of art in the choice of subjects, in the grouping and composition. A very competent critic, M. Léon Gruel, himself one of the great Paris bookbinders, and the owner of a remarkable collection of bindings and of everything that illustrates this fine art, has given a capital account of the value and importance of the retrospective exhibition of bookbinding, to which he was one of the largest contributors. He loaned a copy of an unknown edition of a grand folio "Speculum morale," without date or name of printer, but certainly not later than 1477, for the binding is dated 1478. Gruel describes the binding with all the love of a collector and the critical acumen of a bookbinder. The book was bound by one of his great predecessors as a gift of the Emperor Maximilian, and it is both outwardly and inwardly a fine example of the artistic in printing, illuminating and binding. The next of M. Gruel's exhibits has in gothic characters the name of the binder, for in the fifteenth century and in the beginning of the sixteenth century, the bookbinders took an honest pride in their work, and perpetuated their names on it, often by religious texts in which they commended themselves to the protection of their patron saints. Each bookbinder had his own particular saint, and St. Sebastian, St. Maurice, St. Barbe, St. Nicholas, are thus stamped on the bindings, often with an humble petition for protection, signed by the bookbinder, and

there were books of 1513 and 1526 and 1529 and 1540 so bound and marked, the last a Martial bound for Charles V, by a bookbinder of Amsterdam, with the arms of that city and his own name in full, as well as the arms and motto of the great Emperor. In the good old times every publisher was his own printer and bookbinder, for in the fifteenth and sixteenth centuries no books were sold unbound. The bookbinders went from city to city in search of employment from the printers and publishers, and only in the monasteries were there monks who were employed as authors, illuminators and binders. Every printer and publisher had his own device and legend, which was reproduced on the binding as well as on the title-page. The Elzevirs, the Plantins, the great printers of Amsterdam and Antwerp and Lyons, as well as those of Paris, thus made the binding an integral and important part of their books, and the books with the cypher of Francis I, and the arms of Paul V, the Groliers and the Maïolis, all reveal the owner and the binder.

There was a fine folio Erasmus, printed in Venice in 1508, annotated throughout by Grolier in his own handwriting, with a drawing by him of a medal referred to in the text, and with his familiar legend, "Jo. Grolieriz Lugdunen et amicorum," written on the last page by the owner. There was a Venice Homer of 1539 bearing the name of an amateur binder of great merit, but hitherto unknown. There were bindings for Christian VII of Denmark, and for Louis XIII, as well as those for famous collectors of less rank, bearing the names of the binders, and M. Gruel exhibited a bound copy of the rules of the bookbinders of Paris, 1750, with the name of the binder, the date of his birth, of his marriage, of his apprenticeship and of his becoming a master workman, while the great Padeloup contented himself with putting his name modestly under the title. Among the curious bindings were those of pretended books, really vessels for liquor. On one Franklin's portrait is preserved in a medallion, another has the title "L'Esprit de Rousseau," and as such false books were said to be for the use of country clergymen, there was a special joke in making Franklin and Rousseau, the enemies of the church, contribute to the comfort of its servants. During the French Revolution the nobles had their books bound with republican devices concealing their arms. The Restoration had a wealth of great bookbinders, and their successors of our own day, no matter how strong their rivalry, were close neighbors in the cases in which some of their finest examples were gathered at this Exposition du Livre. There was a wealth of curious historical material, the charters of the bookbinders' associations or guilds of the fourteenth, fifteenth and sixteenth centuries, their accounts, inventories, tools, etc., and a complete library of books on bookbinding, now quite a collection in numbers.

The Exposition du Livre had its historical side. Great rooms were full of material of the most precious kind; the whole story of French caricatures was told on its walls; French art in every form of application to books and printing of every kind was splendidly exhibited, and besides there was a capital exhibition of every industry related to printing—inks, paper,

types, lithographic and photographic and other processes, with the books and illustrations showing their practical uses and application. It was such a collection as only the enthusiasm of Frenchmen could bring together, and yet it lost much of its value and interest for want of a catalogue, for the Exposition must end, the wonderful collections be returned to their owners, and the opportunity of studying the history of printing and book-making in its best sense will be lost. It is almost impossible to hope that such an exhibition can soon, if ever, be organized here. The French have a wonderful talent for organization, and the great collectors seem to have united in this Exposition, giving the loan of their treasures for a long period, arranging them with admirable skill, and sharpening the zeal and enthusiasm for collecting which is useful only when it serves to make the world wiser, by enabling it to take stock of the work of past years, to trace the rise and growth and changes of an art, and none better deserves such painstaking study and research than printing with its kindred and allied industries, and the Paris Exposition du Livre was certainly honorable to French collectors, to printers and binders and artists, all joining to show how much the world owes to France for the past and for the present of the art of printing, revealed in this exhibition.

There was a letter in the *Nation* of September 20 last, describing the Paris "Exposition du Livre," critical and in the main uncomplimentary. In looking back on my own visit to the Exposition, I recall the very instructive and interesting things I saw there, and those of little value have been forgotten. Still I owe to the *Nation* the information that Paris has its "École du Livre"—what it is or where it is the writer does not mention, nor where we can find anything about it. The *Nation* does speak in praise of the foreign exhibits, the publications of the University Press of Cambridge, and says that a handful of illustrated papers and magazines, represented the books of Great Britain, and a great array of names of illustrators, booksellers, journalists and diplomats, headed by the ambassador of the United States in Paris, the members of the American section, but there was nothing from this country or from Italy, Spain or Germany. There was a small but comprehensive exhibit from Denmark, showing to advantage the great Scandinavian illustrators, whose names are too seldom heard out of their own country, intelligent interpreters in good wood engraving, and their work published in volumes, to whose excellence printer, binder and papermaker have all contributed. In Copenhagen, too, there is a "School of the Book," apparently on much the same lines as the institution of that name in Paris. The *Nation* praises, in a half-patronizing way, the retrospective and documentary part of the Exposition, the wealth of the private collections, especially of bookbindings, but in the main condemns the exhibition as a whole. That it deserves more than this is, I think, clear from the abstract you have heard of the articles describing it in the *Bulletin du Bibliophile*, the venerable organ of French book lovers, for it was founded in 1834.

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M. Gruel points, with pride, to the work of early bookbinders, who, like himself, have also been bibliographers in the best sense of the word. He calls attention to the handiwork of the Plantins, who, like their contemporaries, signed their bindings with the same bookmark that designated their printing. Among these were Philippe Pigouchet, Denis Roce, Robert Macé, the Gryphes of Lyons, the brothers Angelius, Jean Bogard, Madeleine Bourselle, widow of François Regnault ; Jacques Dupuis, and the Elzevirs. Christopher Plantin was born near Tours in 1514. His first occupation was that of a bookbinder, which he learned in the workshop of Robert or Robinet Macé, at Caen, who was both printer and bookbinder. Plantin went to Antwerp, where he became famous as founder of the printing and publishing house that existed in his family from 1549 until 1876, when it was made a public museum, one of the most interesting, indeed the only one of its kind in Europe, and well worth a visit. M. Gruel shows that in 1522, Plantin bound the account books of the city of Antwerp ; that he added to his other pursuits that of fine work in leather, boxes, covers, coffers, richly decorated—an artistic handiwork that Gruel, too, has made part of his own trade.

In the Plantin Museum at Antwerp, there is a single example of Plantin's binding with his mark, and the metal stamp is preserved along with the type and the woodcuts used in the volume. M. Gruel reproduces from Plantin's account books the items that show his industry as a bookbinder, giving the prices of the material he used, the mark, a compass with the motto, "Labore et Constantia," the press, the wages paid his journeymen and the bills rendered to his employers, thus bringing us back to the time when bookbinding was an art in the hands of artisans who made it part of their business of printing and illustrating books.

The catalogue of the Museum Plantin Moretus, by M. Max Rooses, the keeper, is interesting even to those who have not enjoyed a visit to this curious relic of the faithful pursuit of one business by the same family for over three hundred years. In 1549 when Plantin established himself at Antwerp, that city was next to Paris in importance. He soon gained reputation for his bindings and his other work in leather. He became a citizen in 1550, and that year a member of the Guild of St. Luke as a printer. In 1555, he printed his first book ; but his work was interrupted on a charge of heresy, and he took refuge for a year in Paris, returning to Antwerp, where he was protected and employed by Philip the II, Cardinal Granvelle, and other notable persons. He printed, under their auspices, a Bible in five languages ; Breviaries and Missals and Liturgies for Spain, for a privilege from Rome for Spain and its colonies was the foundation of his fortune. In 1576, he moved into the building which to-day is the Museum perpetuating his name and work. His son-in-law, Moretus, succeeded in 1589, on his father-in-law's death, to the business, and transmitted it with its traditions on his death, in 1610, to his two sons. One died in 1618, the other in 1641, and was succeeded by his son, who died in 1674. The business passed then to his son, who died in 1692,

and then to his son who died in 1730, and was succeeded by a brother, who died in 1757 ; his son continued it until 1768 ; his widow until 1797 ; their four sons successively until 1820, and they in turn were followed by one of the next generation down to 1865, and he, by a younger brother, who died in 1880, having sold the printing office with all its contents to the city of Antwerp in 1876. The last book bearing the Plantin imprint is dated 1866, but work was continued until 1867, and the last tax paid as printers was in 1871.

The Museum is rich in works of art, principally portraits of different members of the family and the authors and artists employed by them. Rubens and his pupils and contemporaries and successors are well represented. The books of account show exactly what was paid to them for these pictures and for the drawings for the illustration of the books printed by the Plantins. The library is rich in illuminated and other rare and precious manuscripts ; in editions of the Plantin publications from 1555 down to the last issue from their press in 1866 ; in autograph letters and papers relating to their business during all these years ; in copies of the Antwerp *Gazette*, from 1620, the oldest newspaper in Europe. The shop still contains on its shelves the books that used to be on sale, with price currents of books of 1592, 1628, 1642, and the Index expurgatorius of 1569 and 1571, to guard against offering books prohibited by Rome or Spain. The printing office, with its antique appliances, and the memorials of the most famous readers and correctors of the press, many of them men of great learning, are piously preserved. The font of type used in all these years is well preserved, and so are the old presses. The library is rich in incunabula and rare printed books from Guttenberg down, and by way of contrast a complete set of the *Journal des Débats* from 1800 to 1871. Autograph letters, fine wood and steel engravings, maps, plans, portraits, vignettes, engraved arms, book plates, busts, statues, are displayed in great profusion. The dwelling rooms are preserved in their ancient order, and show just how well-to-do people lived in the sixteenth century. There are over fourteen thousand volumes in the Plantin Moretus Library. The main library was built in 1640, and is still as it was then. The archives of the printing house cover all its business from 1555 to 1864, and the foundry where the type were cast still retains its antiquated appliances. There is no counterpart of the old printing office thus piously preserved down to our own day.

The question naturally suggests itself, if the first printers imitated manuscript, how did Latin type come into use. The earliest books were printed with types resembling the styles for book writing then popular in the middle of the fifteenth century. Pointed Black Letter was preferred for church service books, but for books for the laity a simpler form of black letter was preferred, semi or pointed Gothic. In 1486, the German character was first used in Germany. The first printers of Italy, themselves Germans, Sweinheym and Pannartz (1465–73), began work with new types of the Roman form, but with many features of the black

letter. In 1487, Hahn, a rival German printer, began printing in another Roman letter, which also showed a preference for the Gothic form. The first really good form of Roman, adopted everywhere to the suppression of all others, was made by Jenson of Venice, and shown in his *Eusebius* of 1470. Accepted by the educated, it was, however, rejected by the common people, who were just beginning to buy books, and Jenson had to print popular books in Gothic characters, and the most beautiful contemporary books of Paris, the Netherlands and England were in pointed type. The first book printed in England in Roman type was Henry VIII's treatise, which secured for him the title of Defender of the Faith, so printed by Pynson possibly in deference to Italian taste and in compliment to the Pope. Aldus Manutius added a new style, the Italic, based on a written style then popular with copyists. The Italic, first shown in the 1501 *Virgil*, differed from modern Italic in several respects, notably in the fact that the capitals are upright and stand apart from the text. The Lyons founders, moved by the popularity of Italic, soon after produced the *Cursiv François* or *Civilité*, an unreadable letter. The disuse of black letter in France was largely due to Tory of Paris, and his *Champ Fleuri* of 1526. Caxton's type was distinctly Flemish, that of his successors resembled the black letters of the printers of the day of Paris and Rouen. Black letter maintained its popularity in England and the Netherlands, after it had fallen into disuse in France. English printers had no type foundry until John Day established his, 1546–84, and had to accept Dutch type with their mannerisms. English readers showed a marked preference for black letter, and it was used in some of the most popular books, such as the first edition (1525) of Tyndall's *New Testament*, Coverdale's *Bible* (1535), Cranmer's *Great Bible* (1540), and the authorized Prayer Books. In the reign of Roman Catholic Mary, Roman was the proper text for books of devotion, but under Protestant Elizabeth, Prayer Books in black letter had the preference. Fox's *Acts and Monuments* (1560) was in black letter. Soon after the printers evinced a partiality for Roman for English classics. The writings of Shakespeare and Bacon appeared in Roman. Black letter was out of fashion at the close of the sixteenth century."—*Chambers' Encyc., s. v.* "Types."

"The earliest known representation of a printing press is dated 1507, and it pictures an apparatus which is little more than a modification of the ancient wine press—hence the name."—*do., s. v.* "Printing," p. 410.

Under the head of "Black Letter," *Chambers' Encyc.* says: "The first types were copies of the letters in use in the middle of the fifteenth century. Two sorts of letters were in use—*Roman* from the fifth to the close of the twelfth century, when they gradually began to pass into what has been called *Gothic*, which continued till the sixteenth century, when, in most European countries, they were superseded by Roman letters. The classic taste of Italy could not long tolerate Gothic, and it was modified until it assumed the shape to which the name of Roman has since been

HOROLOGIUM ACHAZ.

CHRISTOPHORUS SCHISSLER, GEOMETRICUS AC ASTRONOMICUS ARTIFEX, AUGUSTÆ, VINDELICORUM, FACIEBAT, 1578.

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given. The first works printed with these new types were the two beautiful editions of Pliny's *Natural History*, one by John of Spires at Venice in 1469, the other by Nicholas Jenson, also at Venice, in 1472. Aldus Manutius attempted in 1501 to introduce the Aldine or Venetian Italic, but the Roman soon spread from Venice all over the west of Europe. Although the Germans still continue the use of a form of black letter, about one-half their books are in Roman."

Horologium Achaz (*Christophorus Schissler, Artifex*).

By Julius F. Sachse.

(*Read before the American Philosophical Society, February 1, 1895.*)

Among the scientific apparatus, models and philosophical instruments preserved in the cabinets of this Society, there have been conspicuously displayed two brass plates, finely wrought, engraved, chased and gilded, without, however, bearing any label explanatory of their former use or import.

As a matter of fact they are parts of a unique instrument, the equal of which is not to be found in any museum or scientific collection in the world.

Unfortunately, several parts of this instrument are missing, and among them the mythological figure which once stood upon the base, and elevated or held up the larger plate or basin. The gnomon or rod used to cast a shadow, as well as the apparatus held aloft by the figure upon the rim, whereby a fine pencil of light was thrown upon the dial in place of a shadow (Photo-Sciaterica), are also wanting; the magnetic needle in the small compass in the base has also long since disappeared.

I have endeavored to restore this instrument as well as I could, in the absence of any definite account of how it was in its original state; for no published description was allowed by the censorship of the press, for reasons which I will explain in the course of this paper.

It will be noticed that I have substituted a tripod between base and dial, in place of the lost figure. The instrument was known by the mystics and philosophers of old as an "HOROLOGIUM ACHAZ," or Dial of Achaz.

The smaller of the two pieces measures five and three-quarter inches in diameter, and it formed the base of the instrument. It is made of an alloy, of which silver and copper form the chief ingredients. In a raised centre it contains a compass, one inch in diameter. The intervening space is arranged in two circles, filled with mythological deities and mythical marine monsters, all finely wrought and chased (*ciselirt*).

If we reverse this base, we find beneath it a finely engraved plate heavily gilded with an amalgam of fine gold. It is slightly concave. This plate is divided into five panels; two of these divisions are graduated for different elevations and bear the following inscription, viz.: "Horologii Achaz hydrographica declinatio ad elevat: Poli 44–45–46, Gradv:" and "47–48–49," respectively. Two others contain pictorial scenes which will be described later on. The helix in the centre, which forms the fifth division, contains the following description, viz.: "*Notat concha isthac hemiciclea capitis 38 Esaia miracvlvm: nam hanc si aqva labrvm vsque impleveris vmbra solis 10 imo: 20. gradibvs retrorsvm fertvr signvm ac gradvm solis: quin etiam horam diei vvlgarem qvamcvnque vna cvm planetarvm qvas vocant horis denuncians.*" (*Translation:* "This semicircular shell explains the miracle of the 38th chapter of Isaiah. For if you fill a basin altogether with water, the shadow of the sun is borne backward by ten degrees. Moreover, it indicates any common hour of the day whatever, together with that of the planets which they call hours.")

The larger piece is a basin-shaped plate, made of common brass or gun metal, with a flat, moveable rim one inch wide. Upon this are engraved the signs of the zodiac. On the reverse of this rim, which surrounds the large basin, is engraved the following inscription: "CHRISTOPHORVS SCHISSLER, GEOMETRICVS AC ASTRONOMICVS ARTIFEX AVGVSTÆ VINDELICORVM, FACIEBAT ANNO 1578."

The centre or concave part of this plate is ten inches in diameter, and is geometrically divided into the different planetary houses. The depth of the basin is one and three-quarter inches, and the whole once formed the dial of the instrument.

The rim is surmounted by a brass figure, three and three-quarter inches in height, representing an ancient prophet or astrologer, with the left hand extended so as to hold the "gnomen" used to cast the shadow or to throw the requisite pencil of light.

This instrument was formerly used, nominally, for calculating

HOROLOGIUM ACHAZ.

REVERSE OF DIAL. (DIAMETER ONE-FOURTH OF ORIGINAL.) FACE OF DIAL.

FIGURE UPON THE RIM (SIZE TWO-THIRDS OF ORIGINAL).

nativities, and in the various occult studies wherein the hour of the day or night, and the position of the planetary system of the heavens took a prominent part, as by its aid it was possible to see, not only the true time of day by sunlight, and at night by moonlight, but other solar phenomena, such as the true time of sunrise and sunset; the orb's place in the twelve houses of the zodiac; its perigee and apogee; its height above the horizon; the relative length of the day and night, as well as many other astrological data.

There is, however, another peculiarity about this instrument. In the hands of the Astrologus or Magus of the sixteenth century, it was capable, at the will of the operator, of apparently reversing the laws of nature. Thus, if the basin was filled with water or any other translucent liquid, the time marked was advanced or retarded as many degrees as equal the angle of refraction; thereby repeating the miracle of Isaiah.

To thoroughly illustrate this latter fact, as well as the somewhat obscure inscription within the helix upon the plate beneath the base, and on the two engraved panels, it will be necessary for us to make a practical test of the apparatus and to take up the references to the instrument as given in Holy Writ, even though it may reflect somewhat upon the integrity of the prophet of old, who evidently had some practical inkling of the then unknown laws of refraction.

By referring to the thirty-eighth chapter of the Book of Isaiah, in the eighth verse we read:

"Behold, I will bring again the shadow of the degrees, which is gone down in the sun-dial of Ahaz ten degrees backward. So the sun returned ten degrees, by which degrees it was gone down."

This is what is known as the great miracle of Isaiah, and is portrayed in one of the engraved panels upon the base plate of the instrument. It will be noticed that the invalid sovereign is in his bed, while the prophet is pointing to a sun-dial, which, however, in the representation, is a vertical one—a precaution that was resorted to for obvious reasons by the Augsburg artificer, to distract attention from the true character of this instrument, in case it should ever fall into the possession of the profane.

The other engraved panel on the base plate illustrates the twenty-first verse of the same chapter of the Book of Isaiah, viz.: "For Isaiah had said, Let them take a lump of figs, and lay it for a plaster upon the boil, and he shall recover."

We have here portrayed the consummation of the miracle. The

king is seen seated upon a throne, with his right leg extended, while the prophet is applying a poultice of figs to the wicked carbuncle. An attendant, in the rear, it will be noticed, holds a basketful of the same remedy in reserve.

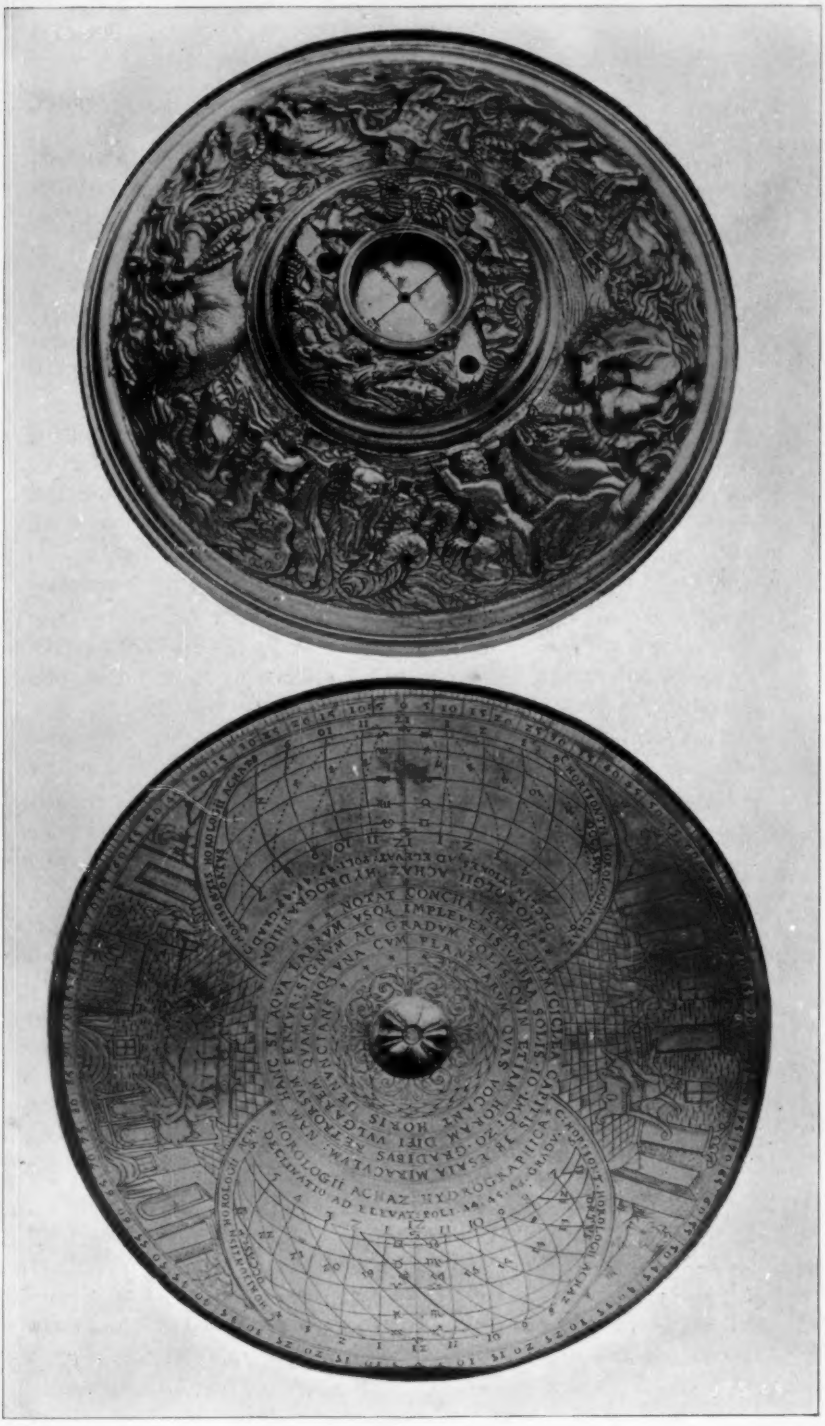
The above mention of the "Dial of Achaz" which had the property of going backwards ten degrees at the command of the old prophet, is the earliest reference to any instrument for the purpose of marking the true time of day of which mention is made in the world's history.

Achaz, who was the son of Jotham and the eleventh king of Judah, about the year 771 B.C. went to Damascus to greet his benefactor, Tiglath Pileser. He saw there a beautiful altar, and sent working drawings of it to Uriah, the priest in Jerusalem. An altar was completed against his return. He likewise set up the dial which is mentioned in the miraculous cure of his son Hezekiah, thirteen years after the death of Achaz. This is the first dial upon record, and is 140 years before Thales, and nearly 400 years before Aristotle and Plato, and just a little previous to the lunar eclipses observed at Babylon as recorded by Ptolemy.

That this instrument and its peculiar properties were not unknown to the scientific faculty of the Helmstadt University, is shown by the Memoirs of Uffenbach, that were published at Ulm, in the early part of the last century. The University at that time was presided over by Dr. Johann Fabricius (Altdorfinus), who was the former tutor at Altdorf of Johannes Kelpius, Magister of the Rosicrucian Community, on the Wissahickon, in Pennsylvania (1694–1708).

Zacharias von Uffenbach, the celebrated scientist and traveler, and former classmate of the younger Falkner at Halle, notes in the Index to his Memoirs, *Sun-dial,—Hiskia, Where the Shadow Turns Back, Curieux*, ii, 542. But on referring to the place indicated, no reference whatever to the subject is to be found. The inference is that the whole matter was, at that time, suppressed by the Censor. There is, however, a reference to the instrument by the same writer in another volume of his Memoirs (Vol. i, 252) of which no mention is to be found in the Index.

Uffenbach, who was always careful to note down the most minute particulars of any special scientific matters brought to his notice, states that, while on a visit to the University Library, Abt Schmid called his attention to a description of this peculiar instrument, and then continues that "he would attribute the especial discovery of



HOROLOGIUM ACHAZ.

BASE WITH COMPASS. ENGRAVED BASE PLATE.

(SIZE ABOUT TWO-THIRDS OF ORIGINAL.)

this peculiar sun-dial to an atheist, and that it would be apt to give such as had no faith in miracles the idea that this was the sun-dial which, by the retrogression of its shadow, furnished the sign for King Hezekiah; or that it was a similarly constructed instrument having the same property, and which being known to the prophet, he, on that account, proposed that particular test to the King."

During a late visit to Europe, a careful search was instituted in the various museums for a duplicate of this Horologium, but without result. So scarce and sought-after are the specimens of Schissler's ingenuity, that the great Germanic National Museum at Nüremberg contains, I think, merely a small pair of dividers from this great artificer. The museum of his native city, Augsburg, contains nothing whatever of his handiwork.

Failing in my efforts to find a duplicate or a similar instrument in either Germany or France, by the aid of which our own specimen might be restored to its original condition, as a matter of interest, I next endeavored to obtain whatever information was to be had relative to the ingenious mechanic whose name adorns the rim of our specimen. Here I was more successful, thanks to the courtesy of Herr Hans Boesch, Director-in-Chief of the Germanic National Museum. The following references to the artificer were found in the Archives of the Museum, viz.:

In Paul von Steffen's account of the "Kunst-, Gewerbt-, u. Handwerks-Geschichte der Reichsstadt Augsburg," it is recorded, that more noteworthy than any one is Christophorus Schissler. This man, according to his apprenticed trade, was a brassworker in a small way, or brazier. His talents, however, led him into geometry, mechanics and astronomy. Therefore, he subsequently called himself a geometric and astronomical master mechanic (*Werkmeister*).

From this artist, continues the old chronicler, there stands in the Bodleian Library at Oxford, England, a solid gold quadrant, which measures more than a Rhenish foot square, and has a weight of six to eight pounds. Upon this instrument is engraved in large letters, "CHRISTOPHORVS SCHISSLER, GEOMETRICVS AC ASTRONOMICVS ARTIFEX, AUGUSTAE VINDELICORUM FACIEBAT, 1579."

I will here state that this quadrant was also known and described by Zacharias von Uffenbach, who states (Vol. iii, 101, 102) that it was of pure gold, and was covered with scales, divisions and calculations, which he thought were poorly executed. The

Librarian of the University at Oxford, however, differed with him, and gave the opinion that the calculations were of even greater value than the precious metal of which the instrument was constructed.

Uffenbach concludes by stating that he would rather have a quadrant with more modern calculations and divisions, and made of gilded brass, as then he would not be afraid to put it to a practical use. He also verifies the dimensions, weight and inscription as above noted.

Speaking of the inscription, the question was raised here some time ago as to the meaning of the word "VINDELICORVM" as applied to this instrument. I will state that the term denotes that the artificer was descended from the ancient German race of the Vindelici, whose chief city, in former times, was "AUGUSTA," therefore "AVGVSTAE VINDELICORVM"—the modern Augsburg.

Again referring to the old records in the Germanic National Museum, it is there stated that Schissler constructed numerous ingenious scientific apparatus and automata for the Emperor Rudolph II. of the Holy Roman Empire. This fact alone, continues the old chronicler, furnishes ample proof of the repute that the artificer had gained by his proficiency in the mechanical arts.

In the year 1600, Schissler was commissioned by the authorities to survey and plot his native city and the suburbs as well as the Imperial Bailiwick (Reichs-Landvogtey). The plan of the city was engraved on copper by Alexander Mair, a noted artist of that day. The other plans were stored at the Land Office. (During my search at Augsburg, none were to be found.)

In the year 1606, Schissler constructed a large *Sphæra Armillaris*, which he presented to the magistrates of his native town, and which was there exhibited for many years in the "Stadt-Bibliothek," but is now missing.

In conclusion, the chronicler states, "in these days (early in the seventeenth century) many of our learned scientists became proficient in Geometry (*Messkunst*) but chiefly in Astronomy."

An equally interesting reference was found in the old "Memorial Buch," wherein one Hector Maire mentions that, in the year 1561, Christophorus Schissler constructed the four large sun-dials upon the "Perlachthurm," at Augsburg, where they still, after a lapse of three centuries, mark the time of day.

The Perlachthurm is one of the peculiar landmarks of the ancient

THE SUNDIALS ON THE PERLACH THURM,

AUGSBURG, GERMANY.

CHRISTOPHORUS SCHISSLER ARTIFEX, 1561.

FROM AN OLD ENGRAVING BY E. HESS.

city, at the confluence of the Wertach and the Lech, and commands a view of the surrounding country. This solitary tower, of which I have here a contemporaneous engraving by Hess, dates back to the tenth century, but has been altered and restored upon several occasions, notably towards the close of the sixteenth century, when it was raised by the celebrated architect, E. Holl, to its present height of 326 feet. It was on this occasion that Schissler was commissioned to construct the four sun-dials, two of which are seen in the engraving. This tower was built as a watch-tower, to discover the approach of the enemy. At the present time it does duty as a look-out for the fire patrol.

The old chronicler goes on to state that Schissler received the sum of 400 florins for his labor on the four dials, while his wife was given 6 florins for assisting her husband.

The account also says that the survey of the city was commenced in 1598. Schissler also surveyed, with the aid of his son, the Lechstrom, completing the work in 1603. From official records it appears that for five years' labor he received the sum of 500 florins, in addition to his expenses.

The Memorial Buch further states that his Meisterstück or *chef-d'œuvre* was placed in the Mathematical Hall of the Zwinger, or Royal Museum at Dresden. It was a *quadratum geometricum*, and bears, beside his usual inscription, the date 1569. This apparatus was for the purpose of measuring both elevation and distance, in which the divisions were given by transverse lines.

He also constructed an ingenious odometer or measuring wheel (*Wegmesser*) which is described by Kirchner, p. 221, Ed. Colon., 1647.

From the above enumerations of Schissler's handicraft, we are safe in assuming that the Augsburg artificer was one of the most ingenious mechanics of his time.

In searching for other scientific authorities who were acquainted with instruments having a similar property, and had left a record of the fact, it is found that Varenius, in his *Geographica Generalis*, makes some general mention of what may be called a refracting dial.

Leybourne, in his work on Gnomonicks (London, 1682), notes that such dials were to be made in two ways, one where the gnomon was hidden all under the water; the other, where the point was above the water. Our own specimen was evidently one that combined the

two principles; a conclusion arrived at by the space for the stylus on the meridial line, which has been replaced, and the figure upon the rim, which evidently supported the elevated gnomon upon the same line.

Ozanan, in his *Recreations* (London, 1708), also gives a problem "to describe a dial by refraction."

The first public mention of, or reference to, the phenomena of the refraction of light was made by Willebrord Snellius (1591–1626), the celebrated mathematician, shortly before his death, or about a half century after it had been practically demonstrated by the Augsburg artificer, as is proven by the specimen here brought to your notice.

After the death of Snellius, René Descartes, by some means, came into possession of the former's experiments on the refraction of light, and published an account of the phenomena, in his *Principia Philosophiæ*, 1637, with several illustrations, from which we may obtain a possible clue to the missing parts once elevated by the figure upon the rim of our interesting specimen.

Schotus, in his *Magia Universalis*, published in 1657, also illustrates the refraction of light, Pl. xxiii, by a simple experiment and plate. None of the above references to a refracting dial, or the refraction of light, however, make any reference to the miracle of Isaiah; thus showing that our scientific relic is unique of its kind, and was known only to persons who were intimately versed in the higher phases of occult philosophy.

The written records of this venerable Society, so far as I have been able to discover, fail to show just from whom this interesting relic of Christopher Schissler's handiwork was received, or even when it came into possession of the Society.

Tradition, however, connects this instrument directly with Dr. Christopher Witt, the last surviving member of the Rosicrucian Community, which two hundred years ago was located on the banks of the romantic Wissahickon, in the vicinity of Philadelphia, and usually known as the "Hermits on the Ridge." Dr. Witt, prior to his death in 1765, gave some of his philosophical and scientific apparatus to the local Philosophical Society, then presided over by Benjamin Franklin, among which presumably was the specimen under discussion.

It will here again be necessary to take a short retrospect, viz.: Between the years 1691–1693, a company of religious and philo-

sophical enthusiasts or mystics was organized in Germany. Their purpose was to escape the religious and secular proscription under which they suffered, by emigation. They naturally cast longing eyes towards Pennsylvania, where liberty of conscience was assured.

These enthusiasts had all received a liberal education, six of the number being clergymen. All were members of the theosophical brotherhood known as "Rosicrucians," and were under the leadership of Magister Johann Jacob Zimmermann, who, as you will see by reference to the reports of the Royal Society, was one of the most noted astronomers of the time in Europe. It was to the possession of this philosopher that this instrument has been traced, prior to his leaving Nuremberg. When finally the "Chapter of Perfection," consisting of the mystic number of forty, was completed, the start was made from the two rallying points, Halberstadt and Magdeburg, for Rotterdam, whence they were to embark for the New World.

Upon the very eve of embarkation, Magister Zimmermann died. The vessel, containing his effects, sailed for America, and Johann Kelpius was elected Magister in his stead; under his guidance, the party of mystic philosophers came to these shores, and upon the romantic banks of the Wissahickon erected a tabernacle in the forest, suited to their occult studies and researches. The structure was surmounted by a "Lantern or Observatory" (*Sternwarte*), in which a nightly watch was kept for celestial phenomena. This was the first regular observatory established in North America.

It is a noteworthy fact in connection with this community, that here in the wilds of the New World were practiced the various mysteries and rites of occult philosophy and esoteric theosophy.

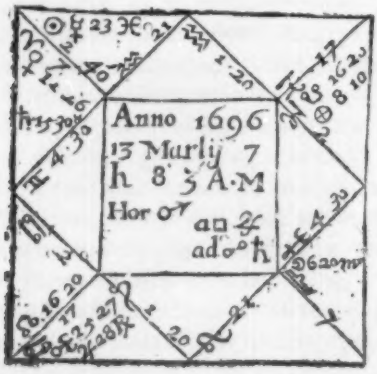
Here the crucible of the alchemist frequently fumed until long after midnight, while the alembic of the Magister was distilling juices of herbs gathered at the dark of the moon, in the hope of discovering the "Philosopher's Stone" or the "Elixir of Life,"—in contrast, as it were, to the lonely watch maintained in the "Sternwarte" on the lookout for the harbinger of the Bridegroom, who was to appear in silky holiness.

Some of the horoscopes that were calculated and cast by these Hermetic philosophers, on the Wissahickon, are still treasured as precious heirlooms among some of the leading families of this State.

To return to our *Horologium*. It is known that after the death of Kelpius, in 1708, and the virtual disbanding of the Community,

all of the philosophical instruments, as well as Zimmermann's astronomical apparatus, passed into the possession of Daniel Geissler and Dr. Christopher Witt. The latter then went to Germantown, and continued in his profession as "Practitioner of Physick" until the end of his days.

It is further known from his correspondence that has come down to us, that Dr. Witt was a close friend of both John Bartram and Benjamin Franklin; also that he was upon intimate terms with others of the original American Philosophical Society: all facts going to substantiate the old tradition as to the actual donor of this HOROLOGIUM ACHAZ HYDROGRAPHICUM, and that the interesting instrument is not only a relic of German mechanical ingenuity of three centuries ago, but also of the chapter of "True Rosicrucians" who settled in the Province of Pennsylvania two centuries ago, and were the first community of Hermetic philosophers who attempted to put their occult teachings to a practical test.



An Old Germantown Horoscope.

Salishan Texts.

(*Read before the American Philosophical Society, March 1, 1895.*)

By Franz Boas.

The following texts were collected in the winter of 1886–87 on the coast of British Columbia. As the languages which they represent are very little known, and as I do not see any prospect of adding in the near future to the material which I now possess, I consider it best to present the same as a slight contribution to our knowledge of the languages of the North Pacific Coast. Heretofore only brief vocabularies of these languages have been published. I have given grammatical notes on a few of them (Proceedings of the British Association for the Advancement of Science, 1891), but no texts which give the best insight into the structure of a language have been made known.

After some hesitation, I have decided to make a few changes in the alphabet applied for recording these languages. Unfortunately the limited facilities of the printing offices deny us the use of diacritical marks, so that a systematic phonetic alphabet is out of the question. After several years of use I have found the alphabet which I applied heretofore not sufficient for the needs of the phonology of the languages of the North Pacific Coast. I have, therefore, adopted the following scheme:

a, e, i, o, u have their continental sounds.
ɛ, obscure e, as in flower.
â, aw in law.
ô, o in *voll* (German).
ɬ, dorsal l, similar to tl.
q, velar k.
k, English k.
k·, anterior k, similar to ky.
x, velar, as ch in German *Bach*.
x·, as ch in German *ich*.
c, English sh.
y, as in year.
! denotes increased stress of articulation.

Bilxula.

This language is spoken on Bentinck Arm and Deans Inlet, on the coast of British Columbia. It represents the farthest northwestern offshoot of the Salishan stock. The texts are fragmentary and indifferent versions of myths. Nos. 1 to 7 were told by a number of young women of the village of Sātsq on Deans Inlet, the dialect of which differs slightly from that of Nuxa'lk·. The last tale was obtained from Nusk·elu'sta, a young man from Nuxa'lk·.

1. The Snēnē'iq.

Apsūlaq tu lumstatx anēl x·nac ēl koana'ts tamnanau'tx.
In the house a man and a woman and it cried their child.

Pōlskts ta Snēnē'iq an'ai'k·sk·ē tk·snikics tamnanau'tx. L'apsktō'o
It came the Snēnē'iq he intended to shoot him their child. He went

ta Lumsta'ix sx·e tk·snic ta Snēnē'iqt. Atemasqtô'o ta
the man and he shot him the Snēnē'iq. He was dead the

Snēnē'iqt. Nutsē'exēsktsal ta kôxlōlE'mx·tx. K·anx·ulx·i'skts
Snēnē'iq. He dug a hole the ground. He did not return

ta Lqulx·t ta Snēnē'iqt ta mnastx. Laputskts ta Lqulx·t
the old the Snēnē'iq his child. He went the old

Snēnē'iqt ska koana'ts. Pōlaqtō'oqtx tôō'qtx ul
Snēnē'iq and he cried. He went down the river down river when

amatsutstx ska koana'ts. Aianmâ'o tsk·ē'lōtsik slē'psōtau
he sat down and he cried. They went up the river they returned

wa spāaxō'nau al ta Snēnē'iq ta koana'iq. Pōla
they they were afraid (of) the Snēnē'iq he he cried.

koa'lotōqtx aql wa s'a'lEmk·au aianmâ'o; tsakui'looq
They went down the river they went up the river up the river; they went down

slēpsutelx·āo sōq'oā'o wa spāaxō'nau. Pōlskts ta Iā'littx sk·a
they returned they were afraid. He came the Iā'lit and

alE'mk·s sk·a anai'x·otsisk ta anusmEna'tx koana'ts ta
he went up the river and together the the dead child they cried the

Lumsta'ix ska amtō'sis ta Snēnē'iqt. Tsai'auts. Ta Snēnē'iqt
man and sitting with him the Snēnē'iq. They stopped. The Snēnē'iq

k·limsk·tâ'o ul ta Iā'littx: "Qamā'its ti x·ā'lo ti k·a ai'tōmsx·'inō. Axkō
said to the Iā'lit: "My dear I wish to cry with you. Not

alnapali'ts ta mnalts. AtEma'ma ta mnats ti x·alo ti k·a
I know (where) the my child. Maybe he is dead the my child. ? ?

aix·'ino ti k·a naix·x·ōtsts. Ti si alai'tsx·'ats ala au'xoa wa inō ti k·ama'ts
? ? here to you the

t'aix· ti la'lia t'aix·. L'aptuts ti lā'lia t'aix· ul i'nō tix·t'ai ti si
the copper this. I give you the copper this to you this (to be a)

staltô'mx·s ta mnals. Alk·!x· kē'x·oa wa sōls ta mnals?
chief (for) the my child. Do you see it the house of the my child?

Wix· alai'ats wa sōls ta mnalts." "A'xkō, k·!x·its," tsutkts
There it is the house of the my child." "No, I (do not) see it," replied

ta Iā'littx. "Tspōstsē'nō skēi k·!x·ix· wa sōls ta mnalts."
the Iā'lit. "I will rub over your eyes and you see it the house of the my child."

"K·!x·itstsEn wa sōls ta mna'lnō." "Aiyai'x· ul i'nō wa sōls
"I see it the house of the your child." "I give to you the house of

ta mnals ske staltô'mx·nōts ska lle'mnō mō'sanmak·nō.
the my child and you will be a chief and you will make a house you four times.

Aitslō'ix·its'a'tsi ul ta Naust'ax." Lapskts ta sta apsō'ls sk·a kunā'mskts
I leave and go to the Naus." He found it the his town and he carried it

ō'ltsōsqlqtx al tu sōls ta Snēnē'iqt. Lōk· a ti smnt tu
down the river out of the his house the Snēnē'iq. On top of the mountain the

sōls ta Snēnē'iqt.
his house the Snēnē'iq.

Translation.

A man and his wife were in their house. Their child was crying. Then a Snēnē'iq came and wanted to shoot the child. Then the man (whose name was Iā'lit) shot the Snēnē'iq and killed him. He dug a hole in the ground and buried him. When the young Snēnē'iq did not return his father went down the river and cried. He sat down and cried. The people who went up the river saw him. They became afraid and returned home. Then Iā'lit went up the river and sat down with the Snēnē'iq and bewailed with him his lost child. When they stopped the Snēnē'iq said to Iā'lit: "My dear, I desired to cry with you. I do not know where my child is. It may be it is dead. I will give you my child's copper and you shall be a chief in his place. Do you see my son's house. There it is." Iā'lit replied: "I do not see it." "I will rub over your eyes, then you will see my son's house." "Now I see your son's house." "I will give you my son's house, and you will be a chief. Four times you shall build a house. Now I will leave this country and go to Naus." Iā'lit found Snēnē'iq's house and carried it down the river. The house was on top of the mountain.

2. Wā'walis.

Ali'skuiL iL x·nas Wā'walis aL tu sōLstx wa sx·L mnā'naq ta qē'qtē
She was inside the wife of Wā'walis in the house and her child the little one.

X·Liā'iamis iL x·nas Wā'walis x·te ix·ā'aLs ti asx·. X·sxa'nskuiL
She wished to eat the wife of Wā'walis the feet of the seal. Her sweetheart

iL x·nas Wā'walis x·ta satsi'sx. X· snāx enax·ē'q Wā'walis ti
the wife of Wā'walis one of his men. His slave Wā'walis the

imilimi'lk· ti wix·koelō'ok·atx ti pā'axLs wô sti tk·ak·aias. Lapsqtô'o
boy the one there sitting he steered and he shot. He went

Wā'walis k·a numpā'ix·s sk·a anoai'k·s ala k·a asx· k·a slax.
Wā'walis and he went in his canoe and he desired the seals the many.

Tk·atisq Wā'walis tsi qē'qtē tsi aa'sx·ui. Lapak·imisqtô'o Wā'walis skya
He shot Wā'walis a small a young seal. He intended Wā'walis and

istō'xis iL a'sx·uiL sk·a q'atī'x·tsis Qōxi'sqtôo x·tō stxumtx.
he cut it the seal and he boiled it with stones. He covered it with a mat.

Ts'ōsEmqtô'o. Walisqtô'o tu sōoLslistx, xō'lisq ta Lā'lastx
It grew dark. He landed at the house, he pushed into the water the canoe

sk·a anai'x·'sqts sx·a q'ōplix·is iL x·nas iL uL ta sxānstx.
and he wished to he watched her the wife at her sweetheart.

Nuk·alik· tō ti snL stsk·tūs Wā'walis ō'la asā'nk·s ta apsōLtx.
In the middle the night he arrived Wā'walis at at the beach the town.

Taiā'mkitstôo Wā'walis sk·aiastā'mkis ta mē'lastx uL apsō'Ltx.
He pointed it Wā'walis he pointed the baton to the town.

Tsitō'mElx·sqtôo ta apsō'Ltx. Axtsqqō ta sati'x·s Wā'walis
They slept the town. He slept with her the man Wā'walis

aL ta sōLs ta mānstx. L'apsqtō'otx Wā'walis uL tu quLē'ixs
at the house of the father. He went Wā'walis to the head part of

tu sxētstanau'tx. Aiak·sqtô'o Wā'walis ats. Lk·imskoiL iL x·nas
the her bed. He scratched Wā'walis he. She said the wife of

Wā'walis: "K·ixōLix· ta tsk·tsōLk·s Wā'walis." Sx·lik·tstō'o
Wā'walis: "I wish it would gnaw the stomach of Wā'walis." He grew angry

Wā'walis sk·a taī'exoisq x·ti tsitō'ma iL x·nasiL. Tsitō'milx·sqt
Wā'walis and he threw (his baton) and she slept the woman. They slept

iL x·nas iL en ti sxānstx. PōLsqtôo Wā'walis sk·a ōstxs
the woman and her sweetheart. He came Wā'walis and he entered

uL tu sōLstx sk·a nik·a'psmis ta sati'x·stx. L'apsqtō'o
at the house and he cut off the head the man. He left

Wā'walis usqa sk·a anux·ulē'ēxuis ta t'E'naqs ta sati'x·Lstx.
Wā'walis outside and he took the head the head of the man.

L'apsqtō'o Wā'walis ō'la ē'k·li sk·a nūLpis to q'aitx
He left Wā'walis to far and he put into it the basket

x·wa aLix·lix· wa a'sx·uL.
boiled meat of seal.

Koanatsqtô'o ta mnais Wā'walis. Slaxs tu sīx·ts aL tu sxētsta
It cried the child of Wā'walis. Much the blood in the bed

mna Wā'walis to plē'eqtuya ta sxāns uL x·nas Wā'walis.
child of Wā'walis the beheaded one the sweetheart of the wife of Wā'walis.

Qōtsisqtô'o iL x·nas Wā'walis ta mnai'nautx sk·a nut'a'xois
She cleaned it the wife of Wā'walis the child and she washed it

ta mnai'nautx, qōts'is tu sxētstanau'tx. Tsitō'mElx·sqtâo ta
the child, she washed the bed. It slept the

mnai'nauL Wā'walis. Aq'oLiaqtôo iL x·nas Wā'walis ta
child of Wā'walis. She wrapped him up the wife of Wā'walis the

sxanstx sk·a LaptUs ōsqa uL tu sxētstastx uL tu asqat'atx.
sweetheart and she carried him out of at her bed at the outside.

Qoqxē'exuisqtô'o.
She covered him.

P'alx·aktô'o tu stanE'mts tu tsaatstē'tx. Iaxoē'mqtau sk·a
She rose the mother of the young man. They shall awake him and

aLps x·tu susqoē'mtsq. "Alatsixō'p'Elk·s ax qiō'osīp?" LapsktÔ'o
eat the the younger brothers. "Why don't you uncover him?" He went

ta Lqu'lax·ilix·itx sk·a qiâ'osis. Nusq'ā'axEmsqtôo: "AL
the almost grown up and he uncovered him. He cried: "Now

tiplē'exts'Entx qamā'tsaia!" Koanatsqtô'o tu tsaatstē'tx. Lētxumsqtô'o
he has no head my dear!" He cried the youth. They assembled

ta sta apsō'Lautx. "Wa stō plē'ex ta sati'x·Ls Wā'walis." Tsai-
the of the town. "No head the man of Wā'walis."

liuatsktô'o sk·a aLī'txums sta apsō'Lautx. Pō'Lsqtôo Wā'walis sk·a
Now all were assembled of the town. He came Wā'walis and

isū'ts. "NuqEnkī'laxsai'k·anix Wā'walis! wa stu plē'ex ta
paddled. "Put into the water your paddles, Wā'walis! for without head the

satī'x·Lnō sxēms wa sō'nxuats." Tsk·tutsktô'o Wā'walis
your man when the sun rose the sun." He arrived Wā'walis

nuLqâmē'exuisqtô'o ta q'aitx sk·a nuq'Lā'nkis iL x·nas iL:
he carried it the basket and he brought her food his wife:

"L'akyanī'x noō'mik·tux atu'xtsi sk·ē'natix wa smatE'mx·nuts."
"Go on! take out that and feed your people."

NuōmIk·tusqtô'iL to q'aitx. "Tix·ēt'ai'x·?" "Ā'xkō, qEnkyē'tix·
She took it out of the basket. "Is it that?" "No, it is below

taiā'mix·." K·isqtô'o ta q'omnēq'ōLs ta sxā'nistx. "Tsix·sā'mats'ai
what you like." She saw the skull of the sweetheart. "Why

tsi nusq'ā'axem aL atustē'ix·?" Ē'p'isqtôo Wā'walis ta mnai'natx.
do you cry at that?" He took Wā'walis his child.

Ēp'isktuts ta LĀ'liatx En ta s'aLoqoala'stx; nupaix·aqtô'o.
He took it the copper and the shamanistic implements; he went into the canoe.

AuLē'mqtôo Wā'walis x·ta sta apsō'Lstx sk·a wuntsi'maxlō
They pursued him Wā'walis those of the town and they wanted to fight him

k·a pākunix·ī'm. ALauaLēmqtô'o Wā'walis nuix·ayaqētōmkoalō'q
and they overtook him. They pursued Wā'walis they were near him,

iasta'mkisqq ta s'aLoqoa'lastx. ATEmanaqqô'o to aLau'Ltaluix.
he pointed at them his shamanistic implements. They were dead these pursuers.

S'ix·Ltsē'squts Wā'walis ala nutsix·sē'exō ala sōlū't.
He paddled on the fjord Wā'walis on fjords to the sea.

Tsālix·luamē'mqtôo Wā'walis.
They did not reach him Wā'walis.

K·!x·isqtô'o Wā'walis ta apsō'Lix q'ōpEmsqtô'o wa smā'oL wa
He saw Wā'walis a town smoking the one the

sōL. Nuk·sā'axisqtôo Wā'walis ta Lala'stx sk·e ēxnusā'kias
town. He landed Wā'walis the canoe and he went into all the houses

aL ta sōLō'k·stx. Axkō elō'k·. Ti k·ik·!x·is ti k·e L'u'msta.
in the houses. No one was there. He saw a man.

Anoai'x·sqts Wā'walis sk·a talau's uL iL mEna's ta Lqulx·tx
He wished Wā'walis and to marry his daughter of the old man

ta auk·au'aLtx. Ē'poisq Wā'walis tu stō'tsēmstx Lqulx·tx.
the blind one. He took Wā'walis the boiled dried salmon of the old one.

Tsalx·lioamisqtô'o ta Lqulx·tx tu slumē'istx tu stōtsE'mtx.
He did not find it the old one the boiled salmon the dried salmon.

Lk·Emsqtô'o ta Lq'ulx·tx uL iLmnas'iL: "Qamai'ts, nuk·x·alēxē'mtx
He said the old man to his daughter: "My dear, look back

qamai'ts uL ti aiaxmi'tstski aL ta s nu'kyakilstx·ū'tsmiLts
my dear, to the playing with the boiled food

uL ti aiaxE'mtstski al ta sta apsōLts tsu tama't'aix·" tu
to the playing with those of the town ?" he

aLaLai'ōts. "'Tssnā'ō, aLai'ōtsLnō, qamai'ts!" Nuk·x·ālaxē'mq
always said so. "Stop! do not talk, my dear!" She looked back

aL qoalaix·ā'lx·. "Tsxtō'tsnō. L'u'msta ta lī'tx·aL inō."
to the old man. "You speak the truth. A man he is near you."

Aiō'tsqtôo q'oalaix·a'lx· Wā'walis: "Anoai'k·ts sk·a talau'sts uL
He said to the old one Wā'walis: "I wish to and marry to

tsi mna'nō ts'aix·." "Anoai'k· tsā'miluk k·!x·ailaix·tō'mx·
the your daughter this." "I will who restores my eyesight

ti x·to ti k·a ai'tōms ti k·a k·!x·ailai'x·tōms ti k·a tā'laus uL tsi
that one he ? he restores my eyesight he marries to the

mnats ts'ai'x·." "Talauststō'oLtsx· anoai'kx·ts aL ti
my daughter this." "I want to marry her I will at the

manuts t'aix. Ustā'm aLi'lk·s ta sta apsō'Lnō Lqamai'ts?"
your daughter there. Where are those of the your town my dear?"

"Lkoanā'ats wa psliuā'tas ta sta apsō'Lts qaaxlā'nauaLō'q
"Once I cried (?) those of the town they went for water

ta sta apsō'Lts. K·nix·tē'mq ta as'akyai'ōtsEmtōLs t'aix·
those of the town. He devoured them the all of them that

al ti qxla t'aix·, qamai'ts. Lōkoa'lats'inō?" "SLōkoalanō'toox·"
in the water this, my dear. Are you a shaman?" "I am a shaman

Ens." "L'ak·anax k·!x·ailaix·tō'mx·." "K·!x·ailaix·tō'minotō."
I." "Go on! restore my eyesight." "I shall restore your eyesight."

K·!x·ailaix·sqtô'o ta Lq'ulx·tx. SEmqlasqtô'o ta qēqtē'tx.
He restored his eyesight the old one. He wanted to have water the little one.

L'apsqtô'o ta snax·Enaxē'tx sk·a qā'axlas. K·nix·ē'mqtôo x·ta
He went the slave and fetched water. He devoured him the

Sk·'āmsk·tx. L'apsqtô'o Wā'walis sk·a iastā'mkis ta s'aLokoa'lastx.
Sk·'āmsk·. He went Wā'walis and he pointed the shaman's implements.

AtEmasqtô'o ta Sk·'āmsk·tx. Nusq'itsqtô'o Wā'walis: "LaLani'x!
He died the Sk·'āmsk·. He cut him open Wā'walis: "Come!

qamai'ts, k·!x·tix· wa smatEmx·nutsx·. Anoai'k·ts sk·a nitsmau
my dear, see the your people. I wish he and make alive

wa smatE'mx·nutsx." "Ā'xkō aLk·pau sk·a smatE'mx·ts. Axtxoaiō'tsnō
the your people." "No they all and my people. Be silent

k·a tEmsnā'axLnōmats k·a tEmsiaiōLmaLnō'mats."
and they will be your slaves and they will be your servants."

L'apak·imtisqtô'o Wā'walis k·a nuta'xtis. Wulxlā'akq'ō ti
He healed them Wā'walis and he washed them. He limped the

nōmā'ō. PatsāLakimi'tsklut Wā'walis ta snā'axstx nut'ā'xois.
one. First he healed him Wā'walis the slave he washed him.

Nut'axtisqtô'o to aik·'em te aLatEmā'tx sk·a snaaxa'qts
Then he washed them those long ago the dead ones and they became slaves

aL iL x·nas Wā'walis. Tsaiak·imsqtô'o sk·a mōsanmak·sqts
of the wife of Wā'walis. He finished and four times

Wā'walis sk·a tskis wa mō'sūL wa sōL wa Lix·Likō'ooL wa
Wā'walis and he made the four the houses the large the

sō'Lōk·s sk·a staltô'mx·sts Wā'walis sk·a Lqoana'tsts Wā'walis
houses and he was a chief Wā'walis and he became great Wā'walis

sk·a stāltô'mx·s.
and chief.

L'apsqtô'o iL x·nas Wā'walis sk·a nūx·'ā'p'is tu ts·ī'maL aL
She went his wife Wā'walis and she washed the intestines of

tu asx·tx. Stsaisqluq wa sk·nix·is iL x·nas Wā'walis.
the seal. She likes only one kind of food the wife Wā'walis.

PōL'aktôo tu siū'ttx sk·a isutau'; nmpēmqtô'o iL
It came the killer whale and paddled; he took her into his canoe the

x·nas Wā'walis. "Wā'walis! nmpē'm iL x·nasLnō x·tu
wife of Wā'walis. "Wā'walis! he took her into his canoe the your wife the

siū'tax." Oqxisqtô'o Wā'walis ta snax·E'nx·istx: "L'aLi'x
killer whale." He said Wā'walis to his slave: "Come!

aULtiLL'a'x k·mā'nx·its iL ta x·nasts." Isō'tsqtôo Wā'walis sk·a
we will follow her recover the my wife." He paddled Wā'walis and

aL'aULtis to siū'ttx. Aianmō'otskuē'lōts'ik· Wā'walis.
he followed it the killer whale. He stopped Wā'walis.

AL'ēpiskoē'lots'ik· Wā'walis ta q'E'lx·sutx; s'aLipōLoosisqts ta
He took it Wā'walis the rope; he let him down the

snēx·iutxē'stx. L'apsqtô'o Wā'walis sk·a mō'lEms sk·a
slave. He went Wā'walis and he jumped into the water and

aLā'uLis iL x·nas iL. QEnqEtxē'k'oē'lk· xēmsqtô'o wa sō'nx·'uats.
he followed the wife. Almost below it got day the sun.

Tsk·tsqtô'o Wā'walis uL ta kôxlō'lêmx·tx. K·lx·isqtô'o Wā'walis
He arrived Wā'walis at the country. He saw Wā'walis

ta qmō'oLank·tx ti k·tsā'tsaiis ta isumkumLē'tx ta Lu
the stout one the one who chopped wood the one who gathered fuel the

qu'lx·'ētx. Ōsēk·a'msqtôo Wā'walis uL ta stntx. Qat'oLō'osakisqq
old one. He entered Wā'walis in the tree. He broke off

Wā'walis to tsī'êxtx. Koana'tsqq ta x·q'ulx·tx: ananā'!
Wā'walis the wedge. He cried the old one: ananā'!

K·exL'ē'ts'ama ta Lqmō'oLanx· ala tsī'êxtsau'a. "Q'ulaix·a'lx·
He grew angry the stout one at his wedge there. "Old one!

tsaiō'tsx sk·ê koana'tnō. Anoai'k·noa sk·a aik·êk·mi'ts atu'xtsi
stop and cry. Do you v 'i and I repair that one

sk·a k·stuts. Axoā'kō aLx·uē'nēmōLnō uL tsi k·a x·nas tsi k·a
and I do it. Not do you know about her the woman her

ā'nopmit k·a ī'sut, qamai'ts?" "Tsix·ma tsi aLkunī't
he carried her into and he paddled, my dear?" "That one her he carried her
his canoe into

ta i sōL tsix·mā'tō tsis nux·ēmā'xtsx· ala sōLs ti staltô'mx·tx·.
the house that one she sits near the fire in the house of the chief.

Ti x·lō'otx· ti iskumLalō'sits k·a qā'axlatsmastu'ts k·a ēxsuLā'nix·its
? the I carry fuel and I carry water and I make fire at

wa sōLs ti staltô'mx·tx·, k·a aLi'tsma aL ti nuLqta'tx· sk·a
the house of the chief, and stay at the post and

aL'iLE'mts. Wīx·i'tsik·'ats sk·a wulā'axits wa qxla'ts.
stand upright. She is there and I pour out the water.

Wix·i'tsik·'ats sk·a L'apnō sk·a ē'pix· tsi x·nasnutsx·." Lapsqtôo
She is there and you go and take her your wife." He went

Wā'walis sk·a ē'pis iL x·nas iL. "L'ak·ē'it, LE'mnō ê'nsts'En ta
Wā'walis and took the woman. "Come! rise I am the

Wā'walis." LEmsqtô'o iL x·nas iL. Tsātsqoā'LEmsqtôo qmō'oLā'nk·tx
Wā'walis." She arose the woman. He lay down the stout one

aL to anuka·'laLis tu sōLtx. Lapsqtô'o Wā'walis sk·a aLēpis iL
on the threshold of the house. He went Wā'walis and he carried her

x·nas iL sk·a lē'psutau uL to kôxlōlêmx·au'tx. Patsāl kuē'lōts'ik·
his wife and they returned to the their country. First

Wā'walis ōnk·snēmūts aL ta q'Elx·tx. Q'ātsatisqtô'o Wā'walis ta
Wā'walis climbed up at the rope. He shook it Wā'walis the

q'Elsx·utx. PōLsqtôo iL x·nas iL uL ta LĀ'las Wā'walis. Tu
rope. She came the woman into the canoe Wā'walis. He

tsapLktuya ta snax·E'naxis Wā'walis. Lapak·misqtô'o Wā'walis
only bones the slave of Wā'walis. He wanted to heal him Wā'walis

sk·a nitsE'mtus ta snax·enaxi'stx. L'apsqtô'o Wā'walis sk·a
and he made him alive the slave. He went Wā'walis and

isō'ts uL ta kôxlōlE'mx·'autx. Lētx·umsqtô'o ta sta apsō'Ls
he paddled to the their country. They assembled those of the town

smaqumaqō'ts snuk·lu'ts smaqtô'o ti s'āmL, sk·a Lqoanā'ats
one winter one the summer and he became great

Wā'walis sk·a stā'ltômx·s ala ta kôxlō'lEmx·s iL x·nas iL.
Wā'walis and a chief at the her country the woman.

Translation.

The wife of Wā'walis and her child were staying in the house. She desired to have seal flippers to eat. One of Wā'walis' men was her lover. Wā'walis went hunting and his young slave steered his canoe. He went to shoot many seals. He shot a young seal, which he cut up and boiled and covered with a mat. When it was dark he landed near his house. He pushed his canoe into the water. He wanted to watch his wife and her lover. At midnight he arrived at the beach in front of the town. He pointed his baton towards the town. Then the people fell asleep. Wā'walis' man slept with her in the house of her father. Wā'walis went to the head part of her bed and scratched at the wall. His wife said: "I wish (that mouse) would gnaw Wā'walis' stomach." Wā'walis grew angry. He stretched out his baton and the woman fell asleep. She slept with her lover. Then Wā'walis came and entered the house. He cut off the head of the man. Then he went out of the house and took the head of the man along. He went far away and put the head into a basket. He covered it with seal meat.

Wā'walis' child cried. The bed of the child was full of the blood of the beheaded lover of Wā'walis' wife. She washed the child and the bed and the child went to sleep again. Then she wrapped up her lover and carried him out of her bed and out of the house. She covered him.

(On the next morning) the mother of the young man arose (and told) his younger brothers to wake him. (They called him, but he did not stir.) "Why don't you uncover him?" The oldest one went and uncovered him. He cried: "O, my dear, he has no head!" The youth cried and the people assembled. "Oh, Wā'walis' man has no head." Now all the people of the town had assembled. Then Wā'walis came paddling. (They cried:) "Put your paddles down, Wā'walis! One of your men was (found) without head when the sun rose this morning." Wā'walis arrived, carrying the basket, in which he brought food for his wife. "Come! take the basket and feed our people" (he said). She took the basket: "Is it this (what you want to give me?" she asked). "No, what you like to have is below." Then she saw the head of her lover. "Why do you cry on seeing this?" Wā'walis took his child. He took his copper and his baton and went into his canoe. The people of the town pursued him. They wanted to kill him. They came nearer. When they were near him he pointed his baton at them and his pursuers were dead. He paddled on the fjord towards the sea. They did not reach Wā'walis.

(Soon) Wā'walis discovered a town. Smoke was rising from one of the houses only. Nobody was to be seen. He saw a man. Wā'walis wished to marry the daughter of this old, blind man. He took the boiled dried salmon of the old man. The latter could not find his salmon and said to his daughter: "Look back, my dear, somebody must be in the town and is playing with my food." He always said so, and she replied: "Stop! do not talk, my dear!" But then she looked back towards the

old man. (She saw the stranger and said:) "You spoke the truth; a man is near you." Wā'walis said to the old man: "I wish to marry your daughter." "I will give her to him who restores my eyesight." "I want to marry her" (replied Wā'walis). "Where are all the people of your town, my dear?" "When they went to fetch water, that being in the water devoured them, my dear. Are you a shaman?" "Yes, I am a shaman." "Then restore my eyesight." "I shall restore your eyesight." He did so. Then Wā'walis' child wished to have water. He sent his slave after water. Then (the monster) Skyamsky devoured him. Wā'walis went out, pointed his baton at it, and Skyamsky died. He opened its belly (and said): "Come, my dear, and look at your people. I wish to resuscitate them." (The old man said:) "They are not my people. Don't say anything, they will be your slaves. They will be your servants." Wā'walis washed them and healed them. One of them limped (because one of his bones was lost). Wā'walis first washed his slave and healed him. Then he washed those who had been dead long ago. They became slaves of Wā'walis' wife. After he had finished, Wā'walis built four times large houses, and he became a great chief.

Once upon a time Wā'walis' wife went to wash the intestines of a seal. She liked only one kind of food. Then the killer whale came paddling and took her in his canoe. "Wā'walis! the killer whale took your wife in his canoe." Then Wā'walis said to his slave: "Come, we will follow him and recover my wife." Wā'walis went in his canoe and pursued the killer whale. He stopped. Then he took a rope and the slave let him down. Wā'walis jumped into the water and followed his wife. When he almost reached the bottom of the sea it grew light, and the sun was shining. Wā'walis arrived in a country and saw a stout old man who chopped a tree for fuel. Wā'walis hid in the tree and broke off the point of the (slave's) wedge. The old man cried: ananah. He became angry on account of his wedge. (Wā'walis said:) "Old man, stop crying. If you so desire, I will repair your wedge. Don't you know about a woman whom a man carried away in his canoe, my dear?" "He carried her into the house, where she is sitting near the fire, in the house of the chief. I am going to carry fuel and water into the house. I shall make a fire. You stay behind the post of the house and wait. She will be right there. Then I shall pour the water into the fire. At that time you must go and take your wife." Wā'walis went and took the woman. "Come, rise. I am Wā'walis." She arose (and they went out). The stout man lay down on the threshold of the house (and made himself so big that the killer whale could not leave the house). Wā'walis took his wife along and they returned to their country. Wā'walis was the first to climb up the rope. He shook it and then the woman climbed into the canoe. Only the bones of the slave (whom Wā'walis had left in the canoe) remained. Wā'walis healed him and revived him. Then Wā'walis paddled to their country. They had been away one winter and one summer. The people assembled and he became a great chief in the country of his wife.

3. The Creation of the Salmon.

Tsalx·liwa'naktô'o stām sEmLx·akoā'la Yula'timōt, Masmasalā'nix
They could not find it the salmon right Yula'timōt, Masmasalā'nix

stām sEmLk·au'aL. Xêltōtx qoax; sk'ix·ā'alasnōs sk·ê ti
the real salmon. He went to fetch it the Raven; he went to find it and the

x·mā'noas. Oqxtix·stô'o qoa'x skukuLx·nastx TsuasTE'lqs,
its soul. They accompanied him the Raven his younger sisters TsuasTE'lqs,

Stsuak·tE'laqs, X·îlx·, Ask·anî'qs. Lapaqtâ'oqs sk·ê isū'tau;
Stsuak·tE'laqs, X·îlx·, Ask·anî'qs. They went and paddled;

tsk·taqtô'o uL ta sōLs ta sEmLk·tx. Iputistô'o ti qoa'xtx·
they arrived at the house of the Salmon. He hid them the Raven

skukuLx·na'stx al ta siup'ā'nxt. TsōsEmqtô'o. L'apaktô'o
his younger sisters at the point of land. It grew dark. They went

sk·ê nuk·'ixâ'aqit tu Lālasā'axt tu sEmLk·. Laptutstâ'uLk· ti
and gnawed through the canoes of the Salmon. He went the

qoa'xtx· sk·ê aLpstâ'omkua. Â'laxîts ti x·mā'nuostx· ti
Raven and they fed him. He wanted to steal the child of the

sEmLk·. AxtsEmkstô'o ti qoa'xtx·. Xēmsktô'o, wa sp'alk·ts.
Salmon. He lay down the Raven. It got day, that he rose.

Xēms aLpstômktuts al ti ē'nôxtx. Tsaiutsktô'o sk·a
It got day they fed him again in the morning. It was finished and

nupai'x·s; sulix·tsēmktô'o x·te staltô'mx·tx.
he loaded his canoe; he gave them traveling provisions the chief.

Aiutsktô'o qoa·x. "Tsix·tx tsi mnanu'tsx· tsi k·auaLts
He said to them the Raven. "Her the your daughter the let her load it

uL ti Lala'stx·." Lapsktô'o qoa'x sk·ê nupai'ts.
in the canoe." He went the Raven and he went into the canoe.

Lapsktô'o iL mEna's ti staltô'mx· sk·ê k·au'aLis
She went the daughter of the chief and loaded his canoe

qoa'x x·iL mE'nas ti staltô'mx·tx. Limasktô'o
the Raven's the daughter of the chief. He took her away

qoa'x x·iL mE'nas ti staltô'mx·tx. Lapsktô'ox qoax
the Raven the child of the chief. He went the Raven

sk·a isū'Lts; tsk·tskxtô'o uL skukuLx·na'stx. PōLskualō'ts ta
and he paddled; they arrived at his younger sisters. He came the

mā'ns iL tsā'atstēi sk·a ā'uLêm qoa'x. Nutsku'lx·skq tu
father of the girl and pursued the Raven. It foundered the

Lala'stx. Anuk·ixua'aqLau TsuasTE'lqs. PōLs ti qoa'x sk·a
canoe. They had gnawed it through TsuasTE'lqs. He came the Raven and

isōLs uL Nuxa'lk·, xtsā'mkix·ts qoa'x iL mE'nas
paddled to Nuxa'lk·, he threw her into the water the Raven the child of

ta sEmLk·. Slaxkts ta sEmLk· aL tu tEmtx.
the Salmon. Many the salmon in the river.

Translation.

Yula'timōt and Masmasalā'nix could not find the real salmon. Then the Raven went to fetch the soul of the salmon. His younger sisters TsuasTE'lqs, Stsuak·tE'laqs, X·îlx·, and Aska·nîqs accompanied him. They went paddling in their canoe and reached the house of the Salmon. The Raven hid his younger sisters behind a point of land. When it was

dark they went and gnawed holes through the bottoms of the canoes of the Salmon. The Raven went and (the Salmon) fed him. He wanted to steal the daughter of the Salmon. The Raven lay down. When it got day he arose. Then they fed him again. When they had finished he loaded his canoe. The chief gave him traveling provisions. The Raven spoke: "Let your daughter put them into my canoe." The Raven went into his canoe. The chief's daughter brought the load into the canoe. Then he took her (into the canoe) and paddled away. They arrived at (the place where he had left) his younger sisters. The girl's father came and pursued the Raven, but his canoe foundered. The Raven's sisters had gnawed it through. The Raven came to Nuxa'lk·. Then he threw the Salmon's daughter into the water, (and since that time) there are many salmon in the river.

4. The Deer and the Raven.

Alai'k·s atE'mas ti mna'is ti sx·panī'Ltx. Wa skoana'tsqts wa
Long ago it was dead the child of the Deer. He cried he

s'ai'mis ti sx·panī'Ltx· s'ānusmE'nas: "Anusuaax·Lai' ta
always the Deer for his dead child: "It is dead (?) the

mnāLsai' ananai'k·s ta mnaLsai'. ALnix·nē'q'ots ānima'sō wa
my child, I cry ananā' for the my child. ? ?

siai'·s ta mnaLsai' ananai'k·s ta mnaLsai'."
? the my child I cry anana for my child."

PōLsktô'o ti qoa'xtx· sk·a anai'x·otsis sk·a koana'ts:
He came the Raven and sat down with him and cried:

"Anoai'k·ts sk·a aLnai'x·otstsino aL ta mnaLno sk·a koanatiL,
"I wish to and together with you to the your child and we cry,

qamai'ts. AnusmEna'nōmak·s ala lau'atuxtsL koanatsmasa auxtsi
my dear. Your dead child ? cry

aL ti anusmE'na x·ti mEnas, qamai'ts." Ti qoa'xtx· sk·a
about the dead child the his child, my dear." The Raven and

qē'exlix·is: "L'aix·L'aix·k·aik·aL ti squ'x·ts'ai," koana'tsqts ti qoa'xtx·
began: "His legs are thin the legs," he cried the Raven

sk·a nuya'mts. Nuya'mtsqts ti sx·panī'Ltx·: "Wix·wix·lx·a'L ti
and he sang. He sang the Deer: "His legs are lean the

squx·ts'ai." Anoai'k·ts ti qoa'xtx· sk·a k·x·nix·i's ta sx·panīLtx
legs." He wished the Raven and for food the Deer

sk·a nūLuqō'axisqts ta sx·pāniLtx ta stsqā'ats. Lapak·imisqtô'o
and he ate his inside the Deer's his anus. He opened him

sk·a i'stox·is. L'apaqtô'o tu susqoē'mtsx sk·a aLxapatē'm
and skinned him. They came the his sisters and carried it home

ta sx·panī'Ltx. Lā'pak·memqtô'o sk·a slomē'm ta sx·panīL sk·a
the Deer. They cut it and boiled it the Deer and

k·x·nix·ē'mts ta sx·panī'L.
it was their food the Deer.

Translation.

A long time ago the child of the Deer died. He always wailed for his dead child. "Oh, my child is dead. I wail for my child." The Raven

came, sat down by his side, and cried: "Let us wail together for your child, my dear." Then the Raven began to sing his wailing song and said: "Your legs are thin." The Deer sang: "Your legs are lean." The Raven wished to have the Deer for food. (He said: "Don't scold me," and pushed him so that the Deer fell down the precipice near which he was sitting.) He began to eat him at his anus. He opened him and skinned him. Then his sisters came and carried the deer home. They cut it, boiled it and it served as their food.

5. The Origin of the Mink.

Sx·umk·ts wa sōnx ats alai'k·. Sx·umā'lustusq T'ōtqoa'ya
It burnt the sun once. He burnt everything T'ōtqoa'ya

alai'k·. Ē'noxmaqs qumaitô'o sk·a ā'nuxyêks wa slax wa
once. In the morning he rose and went to get fuel the much the

nē'ix. Nuk·ali'k·ti sōnxtx sx·umā'lus wa sō'nx ats, sk·a atamā'nauts
fuel. At noon the sun burnt all the sun, and they died

wa slax wa L'umsta'tx·. Slaxs ta xtsāmk·tsut ta Lumsta'tx·.
the many the men. Many swam the men.

Sk·x·nalustōkts ti Snx t'aix· ta mnāstx sk·a taiā'mkits oaxê'nk·
He broke his bones the Snx he the his son and threw him down

sk·a t'ō'kyas ala qêak· ats.
and minks at below (were.)

Translation.

A long time ago the sun burnt everything. T'ōtqoa'ya (mythical name of mink) burnt everything. He arose in the morning and went to get fuel. At noon the sun burnt everything and many people died. Many people (jumped into the water and) swam. Then Snx broke the bones of his son, he threw him down (from the sky) and he became a mink.

Note.—This refers to the tradition of Mink or T'ōtqoa'ya, who was the son of the sun god (Snx) and of a woman. He was maltreated by men and visited his father in the sky, ascending to heaven in one version on the rays of the sun, Snx's eyelashes; in another version along a chain of arrows which he had made. He carried the sun in his father's place, but disobeyed the instructions of the latter, approaching too near the earth. Then the woods began to burn, the rocks to crack and the water to boil. Snx caught his son, flung him down and transformed him into the mink.

6. The Creation of the Sun.

X·Lme'nas ti Snx t'aix· wa namō's wa x·na'suks.
The daughter of the Snx that one the four the girls.

L'apsktô'o qoa'x sk·a qoa'ls uL ta qlatx. Lap anaik·sqtô'o
He went the Raven (as) spike of fir to the water. Fetch she wished to

iL qoalE'm iL mE'nas ti Snx t'aix· sk·a qā'axlas uL ta
the eldest one the daughter of the Snx that one and drank at the

qlatx. Qaaxlamā'nix·isqtô'o ta qoa'lstx. Atsiwilktā'mk·imts qoa'x
water. She drank the spike. She became pregnant with the Raven

sk·a qoa′ls. Mōsqna′mk·imts qoa′x sk·a nōosqonā′mk·imts
(as) the spike. After four days the Raven and she gave birth to

qoa′x. Sk·a anoai′k·sqts ti qoa′xtx ta qē′qtē aL ti
the Raven. And he wished the Raven the little one for the

paqēyê′latx ta nusxē′mtatx. [AL to ai′k·tx s′ênL. Ti sōnx
box the having the daylight. In the past it was dark. The sun

wats ik·a′x; koaloxē′mtEnīL axk·aai′s qoa′x SkuLumā′atlī′oas
it was not; it grew daylight when he went up the Raven. He wanted to have every thing

qoā′x aL to aik·tx.] S′anoai′k·sqts qoa′x sk·a yē′ix·mis
the Raven in the past.] He wished the Raven and to play with

ta qē′qte aL to paqēyê′la is ta mā′nstx. S′ē′Lioks ti Snx
the small with the box of the father. He said the Snx

t′aix· uL ta mnastx: "Sk·a maL anoai′k·ats sk·a yē′ixmis." Sk·a
that one to his child: "And he wishes to and to play." And

yai′aLkunis to paqēyê′latx. Oaxê′nk·. Tsaiautsqtô′o qoa′x
he played with the box. He went down. He stopped the Raven

sk·a koana′ts, s′yaiaxmists to paqēyê′latx.
and crying, he played with the box.

Translation.

Snx had four daughters. The Raven went. (He transformed himself into a) spike, which dropped into the water, (from which) the eldest daughter of Snx used to fetch water. She drank the water and swallowed the spike. She became pregnant and after four days she gave birth to the young Raven. The little Raven wished for the box in which they kept the daylight. [It was dark in the past. There was no sun and it grew daylight when the Raven went up. He wanted to have everything in the past.] He wished to play with the little box of the father. Then Snx said to his child: "He wishes to play with the box." (She gave it to him) and he played with the box. Then the Raven stopped crying and played with the box. (He finally took it out of the house and broke the box. Thus the sun was liberated.)

7. The Boy and the Salmon.

Asqusnōtē′mq x·ta mānstx. Sx·ilik·tsktô′o iL sta′nti-
He always brought him food the his father. She grew angry the his step-

mōts iL. L′aptuskoaluqtô′o sk·a ē′natis iL x·nas iL.
mother the. He gave her to eat and presents of food the woman the.

Nutaiamk·ix·ēmtô′o tu s′e′natiskoalō′tx sk·a aiaLtō′m uL ta
She threw them down the presents of food and she spoke to the

mnastx. Lapskuts ta tsaatstē′tx sk·a sx·lix·lik·tums sk·a ixq′E′ms
his child. He left the youth and he grew angry and went

sk·a k·′ix·ōmats sk·a ixq′E′ms. Lapak·stôo sk·a tk·six·nasqtx·
and he did not know and he went. He left and he shot it

tu tsitsipē′tx. Tk·snā′nix·isqtô′o ta smLk·tx. L′aputsqtô′o ta
the bird. He hit it the salmon. ? the

smLk·tx sk·a nunusqoaxE′msq ta smLk·. Tsk·tsqtô′o ta
salmon and it cried the salmon. He arrived the

tsāastē'tx uL ta smLk·tx. Lk·Emsqtô'o ta smLk·tx: "Tqtsā'-
youth at the salmon. He said the salmon: "Throw

mk·tsx!" L'aptusktô'o ti ·tsāatsē'tx sk·a qtsā'mk·ix·s
me into the water!" He took it the youth and he threw him into the water

ta smLk·tx. Stsux·ēmsqtô'o ta smLk·tx sk·a māLa'pts. Lk·imqstô'o
the Salmon. He jumped the Salmon and once. He said

ta smLk·tx x·k·ix·ā'lasnix·is tu tsāatē'tx tu tsāpts ta
the Salmon he should look for the youth the bone of the

smLk·tx. Āxkōts 'ēk·!k·is tsāatstē'tx ta nutqa'l'axitas ta smLk·tx
Salmon. Not he saw it the youth the bone of the nape of the Salmon

x·wa L'aps k·!x·ēsqtô'o. Laptutsqtu'ts sk·a qtsā'mkis.
that he found it he saw it. He gave it to him and he threw him into the water.

Ia'sqts. Nuk·tsā'axtsōtskts ta smLk·tx sk·a Lala'sqts.
He was good. He came ashore the Salmon and his canoe.

Nupēmô'tskts oqxē'mq ta smLk·; Lapa'kts. Lk·'imsqtô'o ta
He went into his canoe down (?) the Salmon; he left. He said the

smLk·tx sk·a axsE'ms tu tsāatstē'tx. "Axtx qēoxô'mnō."
Salmon and he should pull his blanket over his head the youth. "Not uncover your head,"

tsūtkō'its'ēk ta smLk·tx. "Wix·tō'tsa sk·a tsk·!x·tiL sk·a iaxtsi'nō
spoke the Salmon. "Those and we see them and I awake you

uL ti apsō'L ti tk·!x·iLikō'ots t'aix·." Tsk·taqtô'o uL ta apsō'Ltx.
at the town the we see it that one." They arrived at the town.

Iaxoē'mqtô'o ta sōLs ta t'ēx·Lala'tx. Lapaqtu'ts; tsk·taqtu'ts
He waked him (at) the house of the (a bird). They went; they arrived

uL ta apsō'Ltx tsutsulē'ttsx. S'nuyamlsq s'amit wa s'nuya'mtau
at the town of (a bird). They sang always they sang

tsi tsutsulē'ttsx. Lk·'imsqtô'o ta smLk·tx: "K·a maLyanix·ix·
the (birds). He said the Salmon: "When you like it

ti k·a smā'o ala kôxlō'lemx· ats sk·a ai'ōtsnō uL ēns." Sk·a
the one at country it and speak to me." And

ias ti k·a smā'o. Uā'litktuts ta sōLs iL tsutsulē't
good was the one. They went on to the house of the (bird)

iL. Lapaktu'ts sk·a isutau'; tsk·tatu'ts uL ta sōLs iL
the. They left and paddled; they arrived at the house of the

qulExlēlō'ts iL sk·a iana'xtsq tu ti x·na'sitx. Uali'tktuts.
(bird) the and she was pretty the woman. They went on.

L'apa'ktuts sk·a uali'tk. Tsk·taktu'ts uL ta apsō'Ltx ta sōLs
They left and went on. They arrived at the town the house of

iL qoaqoā'os iL. Ōmaktô'o ta apsō'Ltx sk·a aLaxoai'x·stōm
the (bird) the. They went ashore at the town and he went into the houses

ta tsaatstē'tx. Alōtsqtô'o ta tsaatst'ē'tx: "Sī'as ix·Lō mā'o iL,"
the youth. He said the youth "She is pretty the one she,"

alōtsqtô'o sk·a talau'sau. Lk·Emsqtô'o ta smLk·tx sk·a
he said and they married. He said the Salmon and

sx·uLamisa'lō; alō'tsq ta smLk·tx: "S'ax ti k·a nē'ni·s ti k·a
forbade it: he said the Salmon: "Not he survives he

talau'salo uL iL qoaqoā'os iL." Lapsqtô'o ta tsāatstē'tx uL iL
marries at the (bird) the." He left the youth to her

sk·a axtsE′ms. Xēn̈sqtô′o, amtsqtô′o, s'axtsk· atEmaL. Lapaktu′ts
and lay down. It got day, he arose, not he was dead. They left

uL ta sōLs ta sqāptstx. Aiōtsaqtô′o tu sqāptstx: "Sti
for the house of the sqâpts. He said the sqâpts: "A

kya′ns ti mnas ta smatEmx·au′tx ōmaktô′o sk·a aLēlaxtō′m.
stranger's the child of the their people landed and ?

SEmtsix·koē′lotsiq iL sāmL iL. Tso ōmataLau′tuts k'utsix·a′tx
They reached the sāmL her. They landed

aiō′tsmis ta tsāastē′tx: "Wa sī′as ta kôxlō′lêmx· āmats ta
he said the youth: "Good is the country where the

tai′a ta x·ix·na′sētx." Ē′lōsitqtuts uL ta sō′Ls ta t'litx.
pretty the girls." They avoided at the house of the t'li.

Laputsaqtô′o tu t'litx sk·a iLqoltimōtau′. Aiōtsqtô′o tu tsāatstē′tx,
They left the t'li and she laughed. He said the youth,

Lk·imsqtô′o ta smLk·tx: "Wa sia′nau wa apsō′Lau sk·a
he spoke the Salmon: "They are glad (in) their town and

sq'oa′Lnanau s'iLiLq'ōltimōtau′." Ualiktu′ts. Smtix·koē′lots'iq
they are merry they laughed." They went on. They reached

ta sōLs iL k·'apai′ iL. Sk·a sxsqts sk·a apsō′L iL k·'apai′
the house of the k·'apai′ her. And bad was the town of the k·'apai′

iL. Ualiktu′ts uL ta sōLs ta uai′stx; ō′maqtuts. Sk·a
her. They went on to the house of the silver salmon; they landed. And

aL lexoau′. K·lx·itqtô′o qnusēmqtô′o tsāatstē′tx x·ta smLk·tx
they looked much. He saw he sighted the youth and the Salmon

uL amatau′ tu ti x·nasē′tx snut'axma′qx. Amtēisqtô′o taam
at where they the women bathed. He was sitting there

Lumstanē′tx al ta kôxlāaxō′ts ta nuqla′tx. Lutsō′oLisqtô′o
a man at the bank of the water. They exchanged their cloths

ta Lumsta′tx ti x·q'oē′lok·atx!: "Slutsō′oLa′nix·iL." Stwi′nmau
the men the ? "We will exchange cloths." They came

tu x·ix·nasē′tx sk·a nut'axmau′. Lapaktô′o sk·a qxtsamx·tsutau′.
the girls and bathed. They went and went into the water.

Lapsktô′o tu tsāatstē′tx sx·'anuta′xtis. Xuēnēmuktaktô′o ta
He came the youth he washed them. They recognized him the

tsāatstē′tx. Laputsaqtô′o sk·a nusqā′axma sk·a pā′axōnau.
youth. They left and cried and were afraid.

Lē′psutaqtô′o uL ta sōLs iL sāmL iL. Talau′skuts tsāastē′tx
They returned to the house of the sāmL her. He married her the youth

uL iL sāmL iL, sk·a smō′a axnē′mōtskts x·ti s'ênL, Luas
to the sāmL her, and one he thought the night, two

lānx·qma′lkō. X·LmEna′lx·s ta tsāastē′tx x·a nuLnō′s. Lapā′k·qts
seasons. He got children the youth the two. They made it ready

ta smLk·tx sk·a tu to LĀ′las sk·a Lapau′ts sk·a ta kyē′nau
the Salmon and the canoe and they left and they visited

uL ta sōLs ta māns ta tsāatstē′tx. Tsk·taqtô′o wa
at the house of the father of the youth. They arrived at

stutix·qtuya ta māns ta staatē′tx ti aLqp aL ta siLmā′k·tx
that one the father of the youth the being above at the salmon weir

ti koakonā′tē. K·sisqtô′o ta tsāatsē′tx ta q'Eltsx·tx.
the crying much. He lifted the net the youth the rope of bark.

Xuēnēmutsqtô'o ta mānstx wa stutix·ktuya ta mnastx. Ti
He recognized him the father of that one the son. He

k·!x·is a ta siLmak·txs. Nîtx·umsqtô'o ta sta apsō'Ls ta
saw him at the salmon weir. They came to his house those of the town the

x·q'ulx·tx. Aiōtsqtô'o ta tsāatstē'tx nusqtsōlimx·a'lstx. Ōstxsqtô'o
old one. He said the youth they should clean the house. He entered

ta tsāatstē'x uL ta sōLs ta mānstx. Lats'ā'x·sqts tsāatstē'tx
the youth at the house of his father. He related the youth

wa stsais: "tu iqtx anoai'k·mi tu smLk·tx. Aiō'tsau tu
to all of them: "the cedarbark they desire the salmon. They say the

smLk·tx sk·a aLpstutē'm x·ta iqtx." K·stutē'mqx
salmon and they eat it the cedarbark." They bit each other

swintstē'm x·ta mnmatsaitô'o tu Lu'mstatx sx·êk·tnē'mktuts
they fought the children of the man they struck each other

Lapskuts. "IL mnstā'iL sk·a sx·ix·lix·tE'ms" sk·a ū'allx·s
they went. "The our children and are angry" and she deserted

ta qtEmtstx.
the her husband.

Translation.

The father (of a youth) brought him always food. Then his stepmother grew angry. When (the father) gave her to eat she threw the food which he had presented to her down. She scolded his son. Then the youth grew angry and left. He (went into the woods) without knowing where he went. He went on and he tried to shoot a bird. His (arrow) hit a Salmon. He heard the Salmon cry. When the youth came to the Salmon the latter said: "Throw me into the water." The youth took him and threw him into the water. The Salmon jumped (but did not swim right). Then the Salmon told the youth to look for one of his bones (which was missing). At first the youth did not find the bone of the nape* of the Salmon, but then he found it. He gave it to him and threw him (again) into the water. Now he was perfect. Then the Salmon came ashore in his canoe. He went down to the canoe. The Salmon told the youth to lie down and to pull his blanket over his head. "Don't uncover your head," said the Salmon "I shall awake you when we come to a town." They went and arrived at the town of the birds t'êx·Lala'tx. They went on and arrived at the town of the birds tsutsulē'ttsx. They were singing all the time. The Salmon said: "When you like a country you must tell me." Now he liked this one. They landed and went to the house of the bird. Then they went on and paddled. They arrived at the house of the bird qulExlēlē'ts, and she was a pretty woman. They left and went on. They arrived at a town (where there was) the house of the bird qoaqoā'os. They went ashore and the youth went into her house. He said: "She is pretty," and he married her. The Salmon forbade it and said: "Nobody survives who marries the bird qoaqoā'os." The

* This means probably the soul, which is believed to be located in an egg-shaped bone in the nape.

youth, however, went to her and lay down. It got day and he arose. He was not dead. They departed for the house of the sqāpts. The latter said: "A stranger landed." Then they went on and came to the fish sāmL. They landed and the youth said: "This is a good country. Here are pretty girls." They avoided the house of the fish t'lī. They left her and she laughed. Then the youth and the Salmon said: "They are glad and make merry in this town. They are laughing." They went on and reached the house of the k·'apai' salmon. Her town was bad. They went on to the house of the silver salmon and landed. They looked about and the youth and the salmon saw the place where the women went bathing. A man was sitting at the bank of the pond. The youth exchanged cloths with him. Then the girls came and bathed. They went into the water and the youth washed them, but they recognized him. They ran away and cried. They were afraid. Then they returned to the house of the fish sāmL. The youth married her. He thought he had stayed away one night, but it was two seasons. The youth had two children. Now the salmon made his canoe ready and they went to visit the house of the youth's father. They arrived there and found the youth's father sitting at his salmon weir crying. Then the youth pulled the ropè and lifted the net. The father recognized his son. He saw him at the salmon weir. Then all the people came to the house of the old man. The youth told him to clean it. Then he entered the house of his father, and he related to all of them: "The salmon desires to have cedarbark." It is said that the salmon eat it. (He stayed there with his wife and his children.) Then the (other) children quarreled and fought with them. Then she grew angry and deserted her husband.

8. The Ascent to Heaven.

Nusl̄ōla'nēta.				Tx·sisintē'x·		wa		tsitstsipē'.	
There was a hunting hut at the water.				They shot				birds.	
Anaik·stô'o	x·sgyasqs.		Sx·ik·lx·is		ti	sōnx·	t'aix.	K·lx·tistô'o·	
He wished	to go up.		He wished to see		the	sun	that one.	He saw	
wunaqe'nq	aL	tu	lōk·t'aq.			Slōkoalayā'mktis.			
ducks	at	the	above.			He found something supernatural.			
Ix·ē'eqsātis,		x·tok·stō·ttq.		Nêētststōlā'aqstis,				k·lx·autô'o.	
He cured them,		he worked on them.		He spat on their eyes,				they saw.	
Skoā'tstatit	x·i	Smōq'oā'ns.	Lēptsōtstô'o.		K·lx·īstôo	ti	sâ'axist		
They called him	the	Smōq'oa'ns.	He returned.		He saw him	the	younger brother		
ta	kôxlō'lêmx·'au'tx.		Axsā'nix·tôstô'o		ta	manau'tx.	"K·lx·litsts,		
the	their country.		He made know		the	their father.	"I saw him,		
k·lx·litsts	ta	q'oalê'mts."	"Alatsik·nu'ks		ti	nu'kLôotse'mnō,"			
I saw him	the	my elder brother."	"Why you		the	liar you,"			
tsō'tkuts	ta	manau'tx	uL	tsenL.		"Ts'ak·o'liwa		wa	
said	the	their father	to	him.		"I speak the truth			
sL'iu'kts'awa."		"Wa	iLLana'	ōqxē'x."		"A'xkō	aī'ōts	sk·a	
what I said."		"Go		call him."		"Not	he says	and	

pōLs, ā'xkō anai'k·s ti ts'ē'k·ims k·a ēma'ts sk·a ōstxs.
he comes, not he wished the dirty and he goes and enters.

Anoai'k·kx sk·a la's k·a ē'mats sk·a ōstxs." Koloxsqtô'o
He will and good and he goes and enters." He invited the people

ta manau'tx sk·a qōtsē'm tu sōLau'tx. Qōtsanaqtô'o tu
the their father and wash the their house. They washed the

smātE'mx·tx. Tsāak·ektô'o pōLsktô'o. Ōstxs. A!ats'ēsktô'o
people. They were ready he came. He entered. He informed them

sa uL aai's wu sLōkoa'las anoaik·stô'o sk·a tElaxō'im
how he found something supernatural he wished and he showed

x·stō smatE'mx·stx sk·a wuntstī's tu s'aLōkoala'stx tu
his people and killed with the his supernatural power the

naxE'ntx. Sk·a ēnatē's to sta apsō'Lstx sk·a sq'aɪ.tōtis.
ducks. And he gave them to the those of his town and their meat.

Tsaiōtstutisktô'o. Anoai'k·stuts sk·a lē'ptuts uL ta sōnx· t'aix·.
That is all. He wished and returned to the sun that one.

Koanatsktô'o ta sâ'axistx snuL'api'k·skoalu'ts. ALtsâ'axatisktô'o.
He cried the younger brother he wished to accompany him. He did not want him to go.

Ai'lutstx, axkō tsnuk·sā'axaLE'ms. Sīutā'namEluts, taiā'mk·.
He left him, not he returned. He became supernatural he threw

tisktô'o wa tsitstsipē' ats sk·a sīpx·lioa'ts wa sL'Emstanā'lōsiLs.
them down the birds and he made happy the us Indians.

Translation.

(Two brothers built) a hut for hunting (birds) on a river. They shot birds. One of them wished to go up to see the sun. (When he reached the sky) he saw ducks. He found something supernatural. (The ducks were blind.) He cured them by spitting on their eyes. Then they regained their eyesight. They called him Smōq'oā'ns. He returned and his younger brother saw him. He went and told their father: "I saw my elder brother." "Why do you tell such lies," replied the father. "I speak the truth." "Then call him." "He says he will not come. He does not want to enter a dirty room. He will come and enter when it is clean." The father invited the people and they cleaned the house. The people washed themselves. When they were ready he came. He entered. He informed them how he had found a supernatural helper. He wished to show his power to them and killed many ducks by the aid of his supernatural helper, and he gave the meat to the people of his town. That is all. Then he wished to return to the sun. His younger brother cried and wished to accompany him, but he did not want him to go. He left him and did not return. He became a supernatural being. He threw down birds and made us Indians happy.

The Varying Ratio between Gold and Silver.

By Frederick Prime.

Mr. Prime made some remarks on the varying ratio between gold and silver. Between 1687 and 1861 the ratio of silver to gold varied between 1 : 14.14 (1760) and 1 : 16.25 (1813). But in 1862 silver reached a value from which there has been a steady decrease, with slight exceptions, up to the present time. The ratio for this period * has been as follows:

	GOLD.		SILVER.		GOLD.		SILVER.
1862	1	:	15.35	1878	1	:	17.94
1863	1	:	15.37	1879	1	:	18.40
1864	1	:	15.37	1880	1	:	18.05
1865	1	:	15.44	1881	1	:	18.16
1866	1	:	15.43	1882	1	:	18.19
1867	1	:	15.57	1883	1	:	18.64
1868	1	:	15.59	1884	1	:	18.57
1869	1	:	15.60	1885	1	:	19.41
1870	1	:	15.57	1886	1	:	20.78
1871	1	:	15.57	1887	1	:	21.13
1872	1	:	15.63	1888	1	:	21.90
1873	1	:	15.92	1889	1	:	22.09
1874	1	:	16.17	1890	1	:	19.76
1875	1	:	16.59	1891	1	:	20.92
1876	1	:	17.88	1892	1	:	23.72
1877	1	:	17.22	1893	1	:	26.49

The percentage of production of the two metals since 1831 is as follows, given in values, not in weights:

	GOLD.	SILVER.		GOLD.	SILVER.
1831–40	35.2	64.8	1886	46.8	53.2
1841–50	52.9	47.1	1887	46.0	54.0
1851–55	78.3	21.7	1888	43.9	56.1
1856–60	78.1	21.9	1889	44.2	55.8
1861–65	72.9	27.1	1890	42.3	57.8
1866–70	70.0	30.0	1891	42.4	57.6
1871–75	58.5	41.5	1892	42.5	57.5
1876–80	53.0	47.0	1893	42.7	57.3
1881–85	45.5	54.5			

In consequence of the demonetization of silver and the consequent increased demand for gold, which has increased in value judging by its increased purchasing power, the output of the world in this metal has increased materially.

In 1891 there were produced...196,586 kilograms = $130,450,000
In 1893 " " ...236,574 " = 157,228,100

*Twenty-second Annual Report Director of the Mint, 1894.

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Africa has most markedly increased its output, and in 1893 became the third producing portion of the world, the output being almost entirely in South Africa. While in 1891 Africa produced 23,687 kilograms = $15,742,400, this had increased, in 1893, to 44,096 kilograms = $29,305,800, and it is probable this output will be greatly increased in the near future.

Of the remaining large gold-producing countries the output for 1893 is estimated to be as follows:

United States	54,100	kilograms	= $35,955,000
Australia	53,698	"	= 35,688,600
Russia	39,805	"	= 26,454,400

It is thus apparent that Africa has surpassed Russia.

With the greatly increased output of gold, the fields known to be rich but still undeveloped (South Africa, Australia and South America), and with the downward tendency of silver, it seems impossible that bi-metallism can exist for any length of time in the near future, even by the consent of all the nations of the globe. Gold may be made the circulating medium, or silver may be; but with the continual disparity in value between the two metals, which is not constant but varying daily, the two can only coëxist in subsidiary coinage, where they are mere tokens.

The fact is frequently lost sight of that gold and silver are only articles of merchandise like wheat, cotton or iron, and intrinsically are of less value than any of the three latter. A coin only means that the country whose stamp it bears guarantees it to be of a certain weight and to contain a certain percentage of gold or silver. Common agreement has made these articles of merchandise the means of paying balances, as a matter of convenience.

The Significance of the Jugal Arch.

By Daniel Denison Slade.

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It is difficult to explain why that portion of the mammalian cranium which presents so prominent and striking a feature, even to the most careless observer, as does the jugal or zygomatic arch, should not have been considered worthy of more extended scientific notice than it has received. Cuvier, in his admirable treatise, *Anatomie Comparée*, seems to have been the only writer, familiar to us, who has comprised the anatomy and physiology of this region in any lengthy description.

While the present paper does not pretend to have, by any means, exhausted the subject, it claims to have brought together for the first time, under the light of modern science, a concise statement of the chief modifications which the arch undergoes in the various orders of the Mammalia.

This osseous bridge connecting the lateral regions of the cranium with those of the face is often composed of three bones, the malar or jugal in the centre, flanked on either side by the zygomatic process of the squamosal and by the malar process of the maxilla. Again, it may be reduced to two, the process of the squamosal and the jugal, or the process of the squamosal and the postorbital process of the frontal. The number of bones present depends upon the advanced or receding position occupied by the orbit, also upon the position held by the articulation of the mandible in relation to the orbital cavity, whether this be above, below, or on a level with the latter. Although the arch in certain cases is imperfect, it can rarely be said to be entirely absent.

The strength of the jugal arch, the most important factor in its existence, depends upon its line of direction, whether this be straight or curved, and upon the amount and manner of this curvature; upon the number, size, extent of surface, and mode of union of its component bones. These, in their turn, are correlated with the articulation of the lower jaw, and with the amount of surface presented by the ascending ramus; with the neighboring fossæ, crests and processes; with the dental series, and necessarily with the muscles concerned in mastication, varied as these are in their action.

The jugal arch, as it exists in the Carnivora, offers an instructive example of the various points to be considered in its morphology. In the tiger, for example, the arch, composed of three bones—the squamosal, malar and maxilla—presents an extraordinary horizontal curvature, thereby vastly increasing its expanse, giving great width to the temporal muscle, which taking its origin from the largely expanded surface of the parietal, and from the occipital-sagittal crest, passes forwards and downwards, to be inserted into the high, wide, oblique, coronoid process of the mandible. This increase in length of the arch, due to the great horizontal curvature, is also seconded by the advanced position of the orbit upon the skull, and by its height above the level of the articulation of the mandible.

The vertical curvature of the arch, with the convexity above and concavity below, denotes increased power of resistance to the strain produced by the muscular fibres of the masseter, which, springing from the under side of the arch, are carried obliquely backwards and downwards to be inserted into the deeply grooved ascending ramus. The action of the pterygoids, which is similar to that of the masseter, is also relatively powerful. The fibres rising from the pterygoid fossæ and plates are inserted into the inside of the angular portion of the lower jaw, and into the neck of the condyle. The suture by which the processes of the squamosal and jugal are joined, extends very obliquely through a greater portion of the arch; this obliquity imparting much strength to the bony structure, and thereby enabling it to resist the upward pressure.

The convex surface of the transverse condyle of the mandible, received into the deeply grooved glenoid cavity, forms the hinge-like articulation fitted for the vertical action of the jaw, and which is necessary for the pre-

hension, tearing and division of the flesh by means of the characteristic teeth.

In the Edentata, on the other hand, the cranium of the great ant-eater exhibits a jugal arch which is the extreme opposite of that which has been thus partially described. Here, it is very incomplete, consisting of a short styliform process given off by a very rudimentary jugal, and of an extremely small tuberous zygomatic process from the squamosal, no union being formed between the two. There is no postorbital process of the frontal, and no separation between the orbital and temporal fossæ. Under these circumstances, the muscular development concerned in the preparation of the food is very feeble, correlated as it is with the entire absence of teeth and any necessity for mastication.

Between these two extreme modifications, there are many intermediate forms of this arch, as will become evident as we study them in the different orders of the Mammalia.

In the PRIMATES the arch is composed of two bones, the squamosal and malar, which are joined by a serrated suture which inclines downwards and backwards; the amount of inclination being modified in the various groups of this order. The strength and curvature of the arch also widely vary, as does also the extent to which the various crests and ridges for muscular attachment are developed. In man, the arch is generally slender, slightly curved in its horizontal axis, and presents a very moderate convexity upwards in its vertical curvature. Owing to the slight horizontal curvature outwards, the temporal fossa is relatively shallow, consequently allowing but little development of the temporal muscle. This condition, however, is subject to modifications in the various races of man. The maximum breadth of the cranium is at the jugal arches, and it is at these points that craniologists now take the bizygomatic diameter of the face.

Humphrey, in his *Human Skeleton*, in speaking of this arch, says: "The upper surface of its root forms a smooth channel for play of the temporal muscle. In the negro the greater width of this channel throws out the zygoma into stronger relief, and added to the flatness of the squamosal portion, affords more space for the temporal muscle." This general statement is not confirmed by any cranial measurements, neither does Mr. Humphrey state what he means by a negro. Probably he intended, as in common parlance, to designate the African, although this designation is ambiguous, as it is well known that the crania of the different tribes of Africa differ very essentially in their general formation, as well as in their special cranial measurements.

Although the cephalic measurements of Broca, Topinard, and others allow a slight increase in the horizontal curvature of the arch in certain instances, which signify a greater development of the temporal muscle, as well as a more extended surface for the attachment of the masseter, yet, as Topinard remarks, in speaking of the bizygomatic diameter, "This measurement by itself often presents difficulties, purely accidental and

local, and entirely apart from the general type. Thus, in every race, cases occur in which the zygomatic process of the squamosal, instead of joining directly with the malar, bends outwards and then resumes the general characteristic direction of the arch, whether this be straight or gently curved. The greatest width under the circumstances falls upon the summit of the bend, which causes the measurement to be unduly augmented."

As a result of the measurements taken upon the crania of the Africans in the collection of the Peabody Museum, and of the Harvard medical school, there was a slight increase in the bizygomatic breadth over those of other mixed European skulls. But no dependence should be put in such measurements, for although in one collection the crania were classified in general as African, nothing was known of their history, and still less of those with which they were compared.

Tables given by Topinard, Flower, and others, of the bizygomatic breadth compared with the total length of the face, apparently do not support the statement of Mr. Humphrey. A more satisfactory method of ascertaining the truth of the point in question would be to obtain by measurement the actual width of the groove in the upper surface of the posterior root of the zygoma, of the African skull and compare this with that of other races. This can be properly effected by taking first the bizygomatic breadth and then the bisquamosal at the most prominent point on the line of suture between the squamosal and alisphenoid; the difference between the measurements would give the breadth of groove.

Cuvier reminds us that the size of the temporal fossa and its muscle have close relation with the age of the animal. In the young, the brain and its case are developed, but the jaws are small, and the forces which move them are wanting in energy. But with age these last are developed, while the intellectual powers constantly diminish. In civilized man, the equilibrium is maintained between the growth of the brain-case, the intellectual powers and the masticatory organs. Can any relation, however remote, be traced between the developed masticatory powers of the uncivilized negro, and the flattened squamosal of his brain case as described by Mr. Humphrey?

The Anthropomorpha have strong jugal arches, longer than in man, and presenting marked horizontal and vertical curvatures. Although, strictly speaking, it is composed of only two bones—the zygomatic process of the squamosal and the jugal, this last rests upon a process of the maxilla so much developed, that in many cases it might be rightfully considered as entering into the formation of the arch. The suture which joins the squamosal and jugal is long and serrated, its great inclination downwards and backwards vastly increasing the strength of the parts as also the power of resistance.

In the gorilla, the arch is relatively broader and more developed than in the other higher apes. The process of the squamosal presents a sudden vertical convexity upon its upper border, at a point corresponding to the

junction of the anterior transverse root, the remaining portion of the arch being nearly of the same width. The breadth of the channel for the play of the temporal muscle is proportionally large. The entire structure of the arch, especially in its horizontal-vertical curvatures, exhibits enormous strength. In the adult male all the cranial ridges attain their maximum size, thus presenting a largely increased surface for the origin of the temporal muscle, while the relative greater breadth of the ascending ramus of the mandible and the increased width of the pterygoid fossæ are correlated with a corresponding development of the masseter and pterygoid. The long and massive canines have reference to the powerful action of the last named muscles, while their use has a sexual relation. The glenoid cavity is transversely broader than in man, and more shallow, its anterior boundary, formed by the anterior root of the zygoma, being scarcely developed, thus allowing greater freedom for the antero-posterior movement of the articulation of the mandible.

In comparing the skull of the male gorilla with that of man, we shall find that the arch of the former is not only vastly stronger, but the bones present a different form and proportions. The squamosal is as long and vertically as wide as the malar portion of the arch, while its upper border rises into an angular form, constituting a very marked convexity, no trace of which is to be seen in man. In the latter the jugal portion of the arch decreases in depth after leaving the body of the bone, whereas in the gorilla it continues of the same depth and is relatively longer.

In the orang, the horizontal curvature of the arch is greatly produced, and strongly developed at the portion corresponding to the malar-squamosal suture. Its inferior border is flattened and thickened. The vertical curvature, however, is not so great, while the channel for the temporal muscle is relatively wider than it is in the gorilla. The crests and ridges of the cranium, especially in the male, express the great energy of this muscle, although the general outline of the arch is far less massive than in the latter ape.

The jugal arch of the chimpanzee presents much resemblance to that of man, being narrow, and with slight curvature, either horizontal or vertical. The malar is anteriorly flatter, and its orbital process is longer and narrower at its base. The extent of surface for the development of the temporal muscle is greater than in man, and the width of the channel relatively increased.

The slight modifications observed in the arch of the gibbons, exhibit a distinct tendency to those shown in the lower types of the Simiadæ. In the old-world monkeys, the arch takes on a sigmoidal curvature, thus presenting upon its superior border, a slight convexity behind and a corresponding concavity anteriorly. The extent of this curvature varies in the different groups. In the new-world monkeys, the postglenoid process of the squamosal is largely increased, while the remarkable extent of the ascending portion of the ramus, both vertical and antero-posterior, has

reference in the howlers to the great development of the vocal organs, rather than to any unusual energy of the masticatory muscles.

In the Lemuroidea, the family of the common lemurs have an arch which in most cases is nearly straight, narrow, long, and distinguished by a malar-squamosal suture, which is almost horizontal in direction, the amount of the overlapping of the jugal by the lengthened process of the squamosal being exceptional, while in some cases the jugal is partially underlapped by a process of the maxillary.

As regards the Carnivora, the general characteristics presented by the arch and the adjacent regions have already been considered, when taking that of the tiger as a typical illustration of their morphology. The order of the Carnivora is divided into two suborders, the true or fissiped and the pinniped (the latter being organized mainly for an aquatic life). The true Carnivora may be classified under three sections—Æluroidea, Arctoidea and Cynoidea. The arch in the families comprehended under the first of these sections presents no modifications specially different from those offered by the Felidæ, unless we may except the Hyænidæ, in which the jugal arch is extremely wide and strong and the horizontal curvature very great. The postorbital of both frontal and jugal are largely developed, approximating each other, while the sagittal crest is high, giving large attachment to the very powerful muscle of the temporal. The ascending rami of the mandible present the corresponding extent of surface for muscular attachments. In the section Arctoidea, the family Ursidæ present an arch which is longer, and of which the horizontal curvature is greater than that of the Felidæ, while the jugal-squamosal suture is more oblique, and the entire bridge much less developed. In the Mustelidæ, the upward vertical curvature is large, but the entire arch is relatively slender.

In the Cynoidea, the strength and curves of the arch occupy a position midway between those of the other sections, being more developed than

those of the Arctoidea, but exhibiting less strength than those of the Æluroidea.

The suborder Pinnipedia is easily separated into three families—the Otaridæ, the Trichecidæ and the Phocidæ. The first of these bear genetic relationship to the Ursidæ in many of the cranial characters. The arch is composed, as in the Fissipedia, of three bones. Of these, the jugal presents a wide backward progressing process, which divides into a short upper and a long lower one, receiving and supporting the extended process of the squamosal, as in a mortise.

The postorbital processes are well developed. A more or less distinctly marked sagittal crest exists with an extended surface for muscular attachment. The coronoid surface of the ascending ramus is wide, but not produced above the level of the arch.

In the Trichecidæ, of which Trichecus is the single genus, the maxilla enters largely into the formation of the arch, the jugal is shorter and broader than it is in the other families, and nearly quadrangular, sending up a prolonged postorbital process from its superior border, while posteriorly its inferior border underlies the process of the squamosal. The condylar surface of the mandible points backwards, while those of the rounded coronoids are scarcely lifted above the dental series.

In the Phocidæ, the composition of the arch does not differ essentially from that of the Otaridæ, although it is relatively much weaker. There are no postorbital processes, and the sagittal crest is less distinctly marked. The angle of the mandible is not inflected.

The Chiroptera are divisible into the suborders Magachiroptera and Microchiroptera. The family Pteropodidæ includes all the characters of the first of these suborders. In Pteropus, the arch is long and relatively slender, and composed of three bones, of which the jugal is splint-like, adhering to the outer and under surface of both the squamosal and maxilla, which meet above it and form the span.

The postorbitals of the frontal and jugal not unfrequently meet, and thus complete the bony orbit. There are strongly developed crests, both occipital and sagittal. The coronoid surface of the mandible is fitted for large muscular attachments, being high, broad and recurved. The angle is flattened and rounded, presenting an extended surface. Of the six families into which the suborder Microchiroptera is divided, the Vespertilionidæ may be taken as the typical representatives. The arch is slender and complete throughout the entire group, except in some of the Phylostomidæ, in whom it is entirely wanting.

When present, the horizontal curvature is large, and the vertical also considerable, the convexity being upwards. In its conformation, it is similar to that of the Pteropodidæ. The orbit is incomplete, the temporal fossæ are relatively large. The parietal crest is but slightly developed. The mandible is stout and high at the symphysis. The ascending ramus is compressed, and bears a coronoid process which is strongly indented for muscular attachment. Immediately below the condyle, is a backward

projecting process. The dental series in this suborder resembles that of the Insectivora, the molars being cuspid. Adopting the classification of the highest authorities, and notably that of Dr. Dobson, the Insectivora may be divided into two suborders, the Dermoptera and the Insectivora Vera. Accepting the above classification, the Insectivora, so far as concerns the jugal arch, may be brought into three groups:

1. Those in which the arch is complete and well developed, comprising the Tupaidæ, Macroscelidæ, Rhynchocyonidæ, Galeopithecidæ.

2. Those in which the arch is complete but more or less feebly developed, comprising the Erinaceidæ, Talpidæ, Chrysochloridæ.

3. Those in which the arch is partially or wholly deficient, comprising the Centetidæ, Potamogalidæ, Solenodontidæ, Soricidæ.

The Tupaia may be taken as a typical form of the first group. The jugal arch is well developed, a postorbital process from the frontal meeting a corresponding one from the malar, thus forming a complete bony orbital ring. The malar has a large longitudinal oval vacuity, which, although unique in this case, when taken with similar vacuities in the palate of this genus, as also in some of the other Insectivora, points unmistakably to the Marsupialia.

The horizontal curvature of the arch is sufficient to counteract any inherent weakness due to the vertical curvature with its convexity downwards. The temporal fossa is moderately extended, while the coronoid surface of the mandible presents a large backward projecting surface, rising high above the transversely produced condyle.

In the second group, where the arch, although complete, is for the most part weak, the cranium presents marked modifications. In Erinaceus and Gymnura the arch is formed mostly by the processes of the squamosal and maxilla which join, while the malar is very small and occupies in a splint-like form the outer and under sides of the centre of the arch. There are no traces of any postorbital processes. The temporal fossa is deep and extended, while additional surface is afforded for the temporal muscle by the prominence of the sagittal and occipital crests. The ascending ramus of the mandible, with its broad, concave, coronoid surface, and the development of the pterygoid fossæ, denote increased masticatory powers, in spite of the apparent weakness of the buttress.

In the Talpidæ, certainly in all of the truly fossorial of the family, the ugal arch is slender, and exhibits no distinct malar bone, no occipital or sagittal crests, and no postorbital processes.

The mandible is long, and the vertical portion presents a moderately extended coronoid surface with a small transverse condyle. The infraorbital foramen is of great size, being a very slender osseous arch which serves for the transmission of the large infraorbital branch of the trifacial, affording the necessary supply of sensory nerves to the muzzle.

In the Chrysochloridæ, which in the general shape of the skull present modifications different from all other Insectivora, the jugal arch is in some species so expanded vertically, that, as Dr. Dobson remarks, "their upper

margins rise above the level of the cranium, giving additional origin to the large temporal muscles." There is no postorbital process given off either by the frontal or zygomatic arch. As regards the mandible, the coronoid process is little elevated, and in some species is nearly level with the transversely extended condyle.

In the third group the arch is incomplete, and in one instance, at least, may be described as entirely absent. In the Centetidæ, the skull is long and narrow, and marked by largely developed occipital and sagittal crests which serve as attachments for muscles of temporal origin. The zygomatic processes of the maxilla and squamosal are very short and rudimentary, while the malar is entirely absent. The temporal fossæ are very large, and the skull retains nearly the same width at their anterior and posterior regions. There is not a trace of a postorbital process. The infraorbital foramen is circular and capacious. There are no pterygoid fossæ. The coronoid process of the mandible is largely developed, its inner surface being concave, and its outer surface flattened. The condyle is small and circular, while the glenoid surface is transversely concave.

The other families of this group, with the exception of the Soricidæ, agree with the Centetidæ in the modifications of the skull that have been described. In the Soricidæ, the cranium is broadest just behind the glenoid surfaces. There is no jugal arch and no trace of a postorbital process. Frequently there is present a strongly marked lamboidal ridge as well as a sagittal crest. There is no pterygoid fossa, but very large vacuities exist on each side of the basis cranii. The mandible resembles that of the Talpidæ, although the horizontal ramus is shorter, while the ascending one "presents a very large and singularly deep excavation upon its internal surface quite characteristic of the genus." The articular surface of the condyle looks backwards instead of upwards. The angle of the jaw is elongated and thin. The infraorbital is large and bounded posteriorly by an osseous bar.

The jugal arch in the Rodentia is always present, and is generally complete, although it exhibits many modifications in its composition. Three bones form the arch, which is straight or slightly curved horizontally, while it almost invariably presents a curvature downwards. The position of the jugal therein serves as a determining character in grouping the various families of the order.

The temporal fossa is often small, showing feeble energy in the action of the temporal muscle. On the contrary, the pterygoid plates and fossæ are often largely increased in relation to the enlarged development of the muscular insertions. In close connection with these conditions, the coronoid process of the mandible is small and even rudimentary, while the parts about the angle are largely expanded. The condyle is little elevated and presents, with few exceptions, an antero-posterior articulating surface. Postorbital processes of the frontals exist in a few of the families, but in no case is there a corresponding process from the arch. The orbit is never separated from the temporal fossa.

In many of the rodents there is present a more or less extensive dilatation of the infraorbital foramen, through which passes, in addition to the nerve, that portion of the masseter muscle which has its insertion upon the maxilla. This extends around the back of the jugal process of the maxilla in a pulley-like manner to an insertion just below the socket of the mandibular præmolar, and thus coöperates with the temporal in moving the mandible in a vertical direction. This attachment of a head of the masseter is peculiar to the order, and explains the use of the vacuity in the maxilla which oftentimes is of vast relative proportions.

All existing rodents fall into two groups, the Simplicidentata and the Duplicidentata. The first embraces the Sciuromorpha, Hystricomorpha, Myomorpha, and the second, the Lagomorpha.

In the Sciuromorpha, the jugal forms the greater part of the arch, extending forward to the lachrymal and posteriorly to the glenoid cavity, of which it forms the outer wall, and is not supported below by a continuation backwards of the process of the maxilla. In the more typical forms there is no enlargement of the infraorbital opening, while the postorbital processes of the frontals are characteristic of the family Sciuridæ. The external pterygoid plate is entirely wanting and there is no fossa.

The arch in the Myomorpha is for the most part slender, and the jugal, which does not extend far forward, is supported by the continuation below of the maxillary process. The zygomatic process of the squamosal is short. No postorbital process of frontal exists. The infraorbital opening varies. In the family Muridæ, especially in the typical forms, this opening is perpendicular, wide above and narrow below, while the lower root of the zygomatic process of the maxilla is flattened into a thin perpendicular plate. Very much the same condition exists in the Myoxidæ, while in the Dipodidæ, the foramen is as large as the orbit, is rounded, and has a

separate canal for the nerve. The malar ascends to the lachrymal in a flattened plate. In close connection with these conditions the coronoid process of the mandible is small and rudimentary, while the parts around the angle of the ramus are much developed.

In the Hystricomorpha, the arch is stout. The jugal is not supported by the continuation of the maxillary process, and generally does not advance far forward. The infraorbital vacuity is large and is either triangular or oval. The coronary process and the condyle are but slightly elevated above the dental series.

In the Chinchillidæ, the jugal extends forward to the lachrymal. In the Dasyproctidæ, Cælogenys is characterized by the extraordinary development of the jugal arch, which presents an enormous vertical curvature, two-thirds of the anterior portion of which, constituting the maxilla, is hollowed out into a cavity which communicates with the mouth. The nerve passes through a separate canal, adjacent to the infraorbital opening.

The jugal arch in the suborder Duplicidentata is well developed.

In the family Leporidæ, there are large wing-like postorbital processes, while the jugal, but feebly supported by the maxillary process, continues posteriorly to aid in the formation of the outer side of the glenoid articular surface, passing beneath the process of the squamosal.

The Lagomyidæ have no postorbital processes, and the posterior angle of the jugal is carried backward nearly to the auditory meatus. The infraorbital opening in the Duplicidentata is of the usual size. The angle of the jaw is rounded, and the coronoid process much produced upwards.

The Ungulata may at the present time be divided into the Ungulata vera, including the two suborders, Perissodactyla and Artiodactyla, and the Ungulata polydactyla, which comprises the two suborders, Hyracoidea and Proboscidea.

In its morphology, the jugal arch of the Ungulata presents various modifications. With few exceptions, two bones alone compose it, the squamosal and jugal, which are connected by a suture, the general direction of which is horizontal. Both the horizontal and vertical curvatures of the arch present considerable variations, as does also its relation to the neighboring parts.

In the Perissodactyla, the family Equidæ exhibits an arch, which, although relatively slender, is quite exceptional in its arrangement. The large and lengthened process of the squamosal not only joins the greatly developed postorbital process of the frontal, but passing beyond, forms a portion of the inferior and posterior boundary of the orbit. The malar spreading largely upon the cheek, sends back a nearly horizontal process to join the under surface of the squamosal process above described, while the orbit is entirely surrounded by a conspicuous ring of bone, thereby clearly determining the bounds between it and the temporal fossa, which last is remarkably small. This fossa is bounded above and posteriorly by more or less well-developed crests and ridges. The pterygoids are slender and delicate, without the presence of any fossa. The glenoid

surface is much extended transversely, concave from side to side, and bounded posteriorly by a prominent postglenoid process. The angle of the jaw is much expanded. The condyle is well elevated above the molar series, while the coronoid process is long, narrow and slightly recurved.

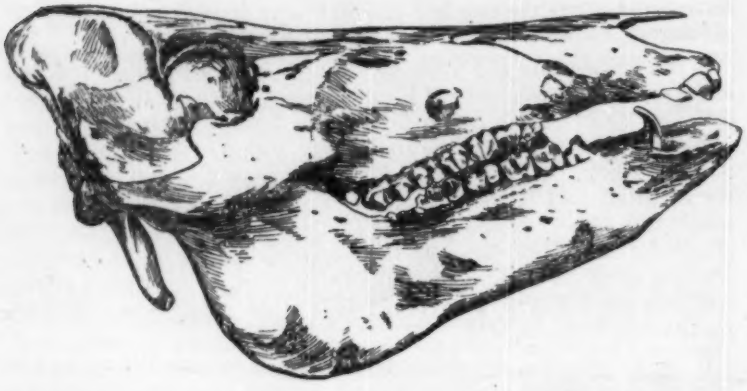
In the Rhinoceridæ and Tapiridæ, the arch is strongly developed, and composed of the squamosal and jugal processes, which are joined at about its centre by an oblique suture from above downwards, backwards and upwards. In the Tapiridæ, the arch is long, owing to the advanced position of the orbit. There is a small postorbital process, largest in the tapir, but the orbital and temporal fossæ are continuous. The surface for the temporal muscle is extensive. The glenoid fossa presents a transverse convex surface to articulate with the corresponding one of the mandible, which is not much elevated above the dental series. The coronoid process is slender and recurved, while the angle is broad, compressed, somewhat rounded and incurved.

In the Artiodactyla, the arch is slender and is composed of the process from the jugal, which passes backwards beneath the corresponding forward projecting process of the squamosal, the juncture being by a suture nearly horizontal in direction, and longest in the Cervidæ. The jugal sends up a postorbital process to meet the corresponding descending one of the frontal, the suture which unites them being about midway. The bony orbit is thus complete, while the jugal is forked posteriorly. The temporal region is relatively small. The horizontal curvature of the arch is very slight. The glenoid surface is extensive and slightly convex with a well-developed postglenoid process. The pterygoids present a large surface and are situated nearer the middle line than is the case in the Perissodactyla. The condyle is broad and flat, and the coronoid process is long, compressed, and slightly recurved. The angle is rounded and much expanded.

The Tylopoda alone among the Ruminantia have large surfaces with crests and ridges for the increased development of the temporal muscle. The horizontal curvature of the arch is greater than in the true ruminants, consequently the temporal fossa is wider and deeper—all in correlation with the powerful canine teeth. The forked articulation between the molar and squamosal is also more strongly marked.

Among the non-Ruminantia, the family Suidæ exhibit an arch in which the process of the jugal underlying the squamosal extends back to the glenoid fossa—the two bones being connected by a suture, which is vertical anteriorly for the depth of half the bone, and then horizontal. The postorbital process does not meet the frontal, in fact all traces of this are lost in Sus scrofa, but in the peccary and Barbaroussa it is quite prominent. The arch is short owing to the position of the orbit, and both vertical and horizontal curvatures are considerable. The narrow, transverse condylar surface of the mandible, and the small coronoid process with its

rounded surface, are but slightly raised above the level of the alveolar surface The pterygoid surface is extensive and the fossa deep.



In the Hippopotamidæ, the arch is broad and strong. Its superior border presents a marked sigmoid curvature, and the convexity which is always posterior, is in this case much shorter in proportion. The temporal fossæ, as also the surfaces for the muscular insertions, are extensive. The pterygoid surface is not so large as in the Suidæ. The glenoid fossa is slightly concave, but not bounded externally by a continuation of the jugal. The condyles of the mandible are nearly on a level with the molars, and the coronoid process is small and recurved. The angle is greatly modified for muscular attachment.

In the Hyracoidea, the arch is composed of three bones, of which the jugal is the most important. Resting anteriorly upon the maxilla, the jugal sends backwards a process to form the external boundary of the glenoid fossa. It also sends upwards a postorbital process to meet a corresponding one from the parietal alone or from the parietal and frontal combined, thus completing the bony orbit. Both horizontal and vertical curvatures are slight. The surface for the temporal muscle is largely developed while the pterygoid fossæ are well marked. The ascending ramus of the mandible is high, and the angle is rounded and projects very much behind the condyle, which last is wide transversely, and rounded on its external border. The coronoid process is small, slightly recurved, and not on a level with the condylar surface.

In the Proboscidea, the arch is straight, slender, and composed of three bones. The maxilla forms the interior portion, while the jugal supported upon the process of the maxilla, meets that of the squamosal in the middle of the arch, and is continued under this as far as the posterior root. This modification is unlike that of any other ungulate. There is a small postorbital process from the frontal. The temporal surface is exten-

sive, and that of the pterygoid considerable. The ascending ramus of the mandible is high, and the condyle small and round. The coronoid process is compressed, and but little elevated above the molar series, while the angle is thickened and rounded posteriorly.

The jugal arch in the order of the Cetacea presents some singular modifications. In the Delphinoidea, the squamosal, frontal and jugal enter into its composition. The squamosal sends forward a large, bulky process which nearly meets the descending postorbital process of the frontal. The jugal is an irregular flat bone, covered by the maxilla, and sends back from its anterior and internal border a long and very slender process, curved slightly downwards, to articulate with the short obtuse process of the squamosal, thereby forming the lower boundary of the orbit. So far as the relations of the squamosal and frontal are concerned, the portion of the arch thus formed is a counterpart of that of the horse: although the union of the two bones is much more complete in the latter animal. The jugal in the horse is relatively a much larger bone, and sends back a well-developed process which underlies that of the squamosal, with which it is joined by a nearly horizontal suture, thus forming a strong suborbital bony wall. The delicate character of the suborbital process of the jugal, and its union with the squamosal in the Delphinoidea, render it difficult at first sight to determine its relation to the arch, and yet when compared with that of the horse, its homological character cannot be disputed.

In the Balænoidea, much the same conditions are presented, except that the suborbital process of the jugal is both stronger and more curved. The small capacity of the temporal region, as well as the limited extent of the arch in the Cetacea, are correlated with the modifications presented by the mandible, in which the condylar surface is small, and looks directly backwards. There is no ascending ramus, and the coronoid process is quite rudimentary—all of which conditions are in direct relation to the nature of the food, and absence of the masticatory movements.

In the Sirenia, the arch is greatly developed, being composed of the squamosal and the jugal. The former of these is much thickened and presents upon its external face a smooth, convex surface. In the Manatus, this process of the squamosal rests loosely upon the process of the malar, which, underlying it, extends back as far as the glenoid, having first formed a rim which is both suborbital and postorbital, besides sending a broad plate downwards and backwards, thereby greatly increasing the vertical breadth. The orbital fossa is separated almost completely from the temporal by a bony partition. The surface for the muscular attachments, both of the temporal and masseter, are extensive, while the pterygoid plates and groove are relatively enlarged. The vertical curvature of the arch is great, but the horizontal is inconsiderable. The ascending ramus of the mandible is broad, compressed, with rounded angle and surmounted by an obliquely placed, small convex condyle, much raised above the molar series. The coronary surface is broad, directed forwards, and but slightly elevated above the condyle.

In the Dugong, the arch is much less massive. There is no postorbital process from the jugal, and consequently no separation of the orbital and temporal fossæ by a bony orbit. The coronoid process of mandible looks backward.

Although the horizontal curvature of the arch is very slight in both genera of the Sirenia, the temporal fossæ are deepened and extended, conditions due to the walls of the cranium being compressed in a lateral direction, which materially increases the extent of surface for muscular attachment and development.

In the order Edentata, the jugal arch also offers unusual modifications. In the Myrmecophagidæ, it is very incomplete, being composed of the proximal end of the jugal, articulating with the narrow projecting process of the maxilla, and a very rudimentary fragment of the squamosal. These separate portions, however, do not meet, in fact they are widely separated. There is no boundary between the orbital and temporal fossæ, the latter being comparatively shallow. The glenoid fossa is a slight cavity running antero-posteriorly, and well adapted to the pointed, backward projecting condyles of the mandible, whose long straight horizontal rami present neither coronoid process nor angle. In Cycloturus, the mandible is somewhat arched, and presents a well-marked angular process, as well as a coronoid surface slightly recurved.

In the Bradypodidæ, containing the two forms, Bradypus and Cholœpus, the arch is imperfect, consisting of the jugal, which is narrow at its articulation with the lachrymal and maxilla, but which widening out into a broad compressed plate, terminates posteriorly in two processes, the upper pointing backwards and upwards, while the lower looks downwards and backwards. The straight process of the squamosal, although fairly developed, fails to meet either of those of the jugal. There is a postorbital process of the frontal, which is best marked in Cholœpus. The glenoid is shallow and narrow from side to side. The mandible, widest in Cholœpus, develops a rounded convex condylar surface, well raised up from the dental series, while the coronoid surface is large and recurved. The rounded angular process projects backwards to a considerable extent. The symphysis in both forms is solidified, while in Cholœpus it projects forwards into a spout-like process. The temporal surface for muscular attachment is large, as also are the pterygoid plates.

In the Dasypodidæ, the arch is complete, and in its formation the jugal largely enters. This bone extends from the lachrymal and frontal to the process of the squamosal, the anterior third of which it underlies. There is no postorbital process of the frontal. The glenoid presents a broad, slightly convex, transverse surface. The pterygoids are small. The mandible has a high ascending ramus, the condyle is transverse and above the alveoli, while the coronoid surface is large and the angle broad and projecting.

In the Manidæ, the arch is incomplete, owing to the absence of the malar, which if present would occupy almost the exact centre of the arch,

the length of the squamosal process and that of the maxilla being nearly equal on either side. The temporal and orbital fossæ form one depression in the side of the skull. The rami of the mandible are slender and straight and without teeth, angle, or coronoid process. The condyle is not raised above the level of the remainder of the ramus.

In the Orycteropidæ, the arch is complete, and the horizontal curvature is very slight. The postorbital process is well-developed. The mandible rises high posteriorly, with a coronoid slightly recurved, and with an ascending pointed process on the angular edge below the condyle.

In the Marsupialia, the jugal arch is always complete, and composed of the jugal, resting on the maxilla and squamosal, the first extending from the lachrymal anteriorly to the glenoid fossa posteriorly, of which it forms the external wall. The process of the squamosal passes above the jugal, being united to it by an almost horizontal suture. The horizontal and vertical curvatures of the arch are considerable, and the space for both temporal and masseter muscular insertions is extensive. The various ridges and crests are large, especially in the Dasyuridæ and Didelphidæ. The postorbital of the frontal is present as a rule, although in most forms inconsiderably developed. The ascending ramus of the mandible is less elevated than in several of the orders of the Mammalia. The condyle is but little raised above the molar series. The masseteric fossa is extremely projected at its lower external border, and the mandible, with one exception, has an inverted border to the angle.

In the Monetremata, the Echidnidæ possess an arch in which the squamosal is compressed, and sends forward a slender straight process to join the corresponding slight shaft-like process of the jugal. The horizontal curvature is extremely small.

In the Ornithorynchidæ, the arch is made up of the malar resting upon a process of the maxilla, which, passing straight backwards, unites with the squamosal process that rises far back on the sides of the cranium. While the mandible of the Echidna has but the rudiments of the parts which usually enter into its formation, that of the Ornithorynchus is more fully developed in relation to the attachment of the horny teeth.

In studying the significance of the jugal arch according as this portion of the mammalian cranium has been presented to us in the preceding pages, while there are modifications in certain groups which are somewhat difficult of explanation, we shall find that the general laws which govern its morphology may be satisfactorily determined. These laws, concisely speaking, are, that the development of the arch, as shown by the number of the bones, by the degree and the number of the curvatures, by its relation to the orbit and articulation of the mandible, as well as to other neighboring parts, and by the amount of surface presented for muscular insertion, all depend upon the energy and character of the masticatory muscles. That these in turn depend upon, and are closely correlated with the habits and environment of the animal.

The above laws are very clearly exhibited in the Carnivora and in the

Ungulata. In the Perissodactyla, the sagittal crest, ridges and extensive parietal surface are correlated with increased insertions of the temporal, while the large, strong and complicated arch has equal reference to a powerful masseter. So in the Artiodactyla, especially in the Ruminantia, the diminished surface for the temporal, and the smaller, weaker arch, both denote lessened energy in the above muscles, while the enlarged pterygoid muscular insertions show that the required action has been provided in another direction. As Prof. Cope has shown, "Forms which move the lower jaw transversely have the temporal muscles inversely as the extent of the lateral excursions of the jaw. Hence these have a diminished size in such forms as the ruminants, and are widely separated."

The singular fact that the Tylopoda alone of the selenodont Artiodactyla possess the sagittal crest, is explained by Prof. Cope, by the presence of canine teeth, which are used as weapons of offense and defense, and which demand large development of the temporal muscles.

The energy of the action of these muscles has reference to the position of the dental series. In the primitive Mammalia, as Cope shows, a considerable portion of the molar series is below and posterior to the vertical line of the orbit, and this condition has been preserved in the Rodentia and Proboscidia, forms which have the proal mastication. But in those which have lateral movements of the jaw, the molar series has gradually moved forwards. The camel alone retains the primitive condition.

The bunodont Artiodactyla, as the Dicotylidæ, have the molar series posterior to the orbit; those with lateral movement of the jaw, the Suidæ, have them more anterior.

In the relation of the arch to the orbit, it is obvious that the position of this last must exert its influence upon the strength of the arch. When the orbit is above or below the articulation a longer and consequently a weaker arch is demanded, than when it is on a level with it. The same may be said when the orbit occupies an anterior rather than a posterior position upon the cranium. A comparison of the crania of the Tapiridæ with those of the Suidæ will corroborate this fact.

Then again the union of the bones by suture imparts a degree of elasticity to the arch which must serve to disperse over a given space the effects of shocks and blows, which might under other circumstances prove injurious.

We have already noted the peculiar vertical curvature of the arch downwards in the Rodentia. This is a decided manifestation of weakness, and is compensated in some of the families by the unusual arrangement made in the distribution of the muscular insertions of the masseter through the infraorbital opening, by which increased energy is imparted to the powers of mastication, and whereby the action of the mandible is rendered equal to the demand upon its efforts.

Where this does not exist, it is evident that the strength of the arch is still sufficient for the antero-posterior movement of the articulation so peculiar to the Rodentia and so characteristic of the act of gnawing. The

ascending ramus of the mandible differs according to the food. Elevated in the Leporidæ, it is short in the Sciuridæ, and still shorter in the Muridæ. In the first, the coronoid projects but slightly, is near the condyle and far distant from the molar series, while the angle is broad and well rounded.

In the other two families, the coronoid is feeble, pointed and placed at equal distances between the condyle and the last molar; thus the masseter does not possess a leverage as advantageous as in the Leporidæ. This muscle, however, in the rats has its maxillary attachments much developed, while few fibres spring from the arch.

It has been implied that modifications of the arch are due to variation as brought about by the effects of increased Use and Disuse, aided by the influences commonly attributed to Natural Selection. To what extent these laws have been carried since the earliest records of mammalian life, it would be useless to inquire, as palæontology affords us little or no evidence. They certainly cannot have escaped those which govern Heredity. In the Carnivora, for example, the arch remains essentially the same as it did in the days of the Creodonta, the ancestors of the cats; and similar conditions undoubtedly apply to other groups, so far as our scanty knowledge extends. We must await farther developments for the solution of this as well as of other even more important problems.

A Matter of Priority.

By Patterson DuBois.

(*Read before the American Philosophical Society, April 5, 1895.*)

It is reported that at a meeting of the Royal Society held June 13, 1894, Mr. J. W. Swan presented a number of specimens of leaves of gold of extreme thinness which had been prepared by the process of electro-deposition. Mr. Swan's idea appears to have been to produce gold leaf by electro-chemical instead of mechanical means. The process is briefly described as follows:

"The leaves were prepared by depositing a thin film of gold on a highly polished and extremely thin electro-copper deposit. The copper was then dissolved by perchloride of iron, leaving the gold in a very attenuated condition. The leaves were approximately four-millionths of an inch thick, and some of them mounted on glass showed the transparency of gold very perfectly when a lighted lamp was looked at through them."

Within a few weeks past I, myself, observed an item going the rounds of the public press in reference to this so-called Swan process. We have

no right to say that the process described by Mr. Swan is not entirely original with him. It is proper, however, to call the attention of the American Philosophical Society to the following facts.

At a meeting of this Society held February 16, 1877, William E. DuBois, then Assayer of the United States Mint in this city, and a member of this Society, made a brief communication (*Proceedings*, Vol. xcix) on the production of gold films by a process such as Mr. Swan has within a few months past, through the Royal Society, brought before the public. The inventor of the process was Mr. Alexander E. Outerbridge, Jr., then an assistant in the Assay department of the Mint at Philadelphia and subsequently engaged in establishing and carrying on scientific laboratories at the Whitney Car Wheel Works and at the large establishment of William Sellers & Company, both in this city.

Apart from any future possibility of producing gold leaf by electrochemical instead of mechanical process, Mr. Outerbridge regarded his results as interesting in a purely scientific aspect. The gold films produced at that time by him seem to have been much thinner than those which were recently shown at the Royal Society by Mr. Swan. Specimens were exhibited in the Philadelphia Mint as early as 1877, and some were obtained by several colleges and individuals. One now in the possession of Dr. George F. Barker, of this city, is accompanied by the written account which Prof. Barker received with it in 1878. This memorandum is as follows:

"Gold film obtained from a copper plate having 20 square inches surface:

"Weight before plating..... $84\frac{470}{1000}$ grs.
"Weight after plating..... $84\frac{505}{1000}$ grs.
"Weight of gold..... $\frac{35}{1000}$ gr.

"Calculated thickness, $\frac{1}{2.794.000}$ of an inch; $59\frac{1}{2}$ times less than a single wave-length of green light."

This is mounted as a slide for a microscope, and has a double fold. I have also specimens in my own possession.

In addition to the brief communication made by Mr. W. E. DuBois to this Society in 1877, as aforesaid, the *Journal of the Franklin Institute* (Vol. ciii, 284) gave an abstract of a lecture delivered by Mr. Outerbridge before the Franklin Institute in 1877. At the stated meeting of the Institute held May 16, 1877, Mr. J. B. Knight, then Secretary, referred in his monthly report to Mr. Outerbridge's process in the following terms:

"*Transparent Gold.*—In the course of a lecture on gold, delivered before the Franklin Institute, on February 27th last, Mr. A. E. Outerbridge, Jr., of the Assay department of the Mint in this city, gave an account of some experiments he had made with the view of ascertaining how thin a film of gold was necessary to produce a fine gold color.

"The plan adopted was as follows: From a sheet of copper rolled down to a thickness of $\frac{5}{1000}$ of an inch he cut a strip $2\frac{1}{2}$ by 4 inches. This strip, containing 20 square inches of surface, after being carefully cleaned

and burnished, was weighed on a delicate assay balance. Sufficient gold to produce a fine gold color was then deposited on it by means of the battery; the strip was then dried without rubbing, and reweighed, and found to have gained $\frac{1}{10}$ of a grain, thus showing that one grain of gold can by this method be made to cover 200 square inches, as compared to 75 square inches by beating.

"By calculation, based on the weight of a cubic inch of pure gold, the thickness of the deposited film was ascertained to be $\frac{1}{980.400}$ of an inch, as against $\frac{1}{2827.630}$ for the beaten film.

"An examination under the microscope showed the film to be continuous and not deposited in spots, the whole surface presenting the appearance of pure gold.

"Not being satisfied, however, with this proof, and desiring to examine the film by transmitted light, Mr. Outerbridge has since tried several methods for separating the film from the copper, and the following one has proved entirely successful.

"The gold plating was removed from one side of the copper strip, and by immersing small pieces in weak nitric acid for several days the copper was entirely dissolved, leaving the films of gold, intact, floating on the surface of the liquid. These were collected on strips of glass, to which they adhered on drying, and the image of one of them is here projected on the screen by means of the gas microscope.

"You will observe that it is entirely continuous, of the characteristic bright green color, and very transparent, as is shown by placing this slide of diatoms behind the film. By changing the position of the instrument, and throwing the image of the film on the screen by means of reflected light, as is here done, you will see its true gold color.

"Mr. Outerbridge has continued his experiments, and, by the same processes, has succeeded in producing continuous films, which he determined to be only the $\frac{1}{2,759,000}$ of an inch in thickness, or 10,584 times thinner than an ordinary sheet of printing paper, or sixty times less than a single undulation of green light. The weight of gold covering twenty square inches is, in this case, $\frac{1}{10000}$ of a grain; one grain being sufficient to cover nearly four square feet of copper."

In a lecture on "Matter," delivered at the International Electrical Exhibition (Philadelphia), October 9, 1884, and subsequently printed in the *Journal of the Franklin Institute*, September, 1885, Mr. Outerbridge himself made the following statement:

"After a series of careful experiments, I have obtained, in this way, sheets of gold, mounted on glass plates, which are not more than $\frac{1}{40.000}$ of a millimetre thick; and I have some specimens to show you which I have good reason to believe are not more than $\frac{1}{400.000}$ of a millimetre. To give you an idea of this thickness, or, rather, thinness, I may say that it is about $\frac{1}{200}$ part of a single wave-length of light. Such figures are not haphazard guesses, but are based upon reliable and understandable data, and are easily susceptible of verification.

"We cannot claim for the thinnest of these films that they represent a single layer of molecules. Taking Sir William Thomson's estimate of the size of the final molecules, and considering that each layer corresponds to one page of a book, our thinnest film would then make a pamphlet having more than a hundred pages. It is found that when such a film is interposed between the eye and any object it is as transparent as a piece of glass. This may be readily proved by projecting a picture on the screen and interposing the leaf of gold in the path of the light and you see that the only apparent effect is to tinge the light a pale greenish color, none of the detail of the picture is lost, though all the light is coming through a piece of gold as absolutely continuous in its structure, when examined under a microscope, as though it were an inch thick. By placing in the lantern a piece of ordinary gold leaf, having a thickness of about $\frac{1}{200,000}$ of an inch, and a piece of electro-plated gold leaf about $\frac{1}{5,000,000}$ of an inch thick, mounted side by side on a glass slide and focusing their images on the screen, you will see a very great difference in the amount of light transmitted by the two, owing to the difference of thickness."

One particularly interesting thing about the foregoing extract is that the lecture from which it was taken was bound in as a part of the literature relating to the exhibition, and sent broadcast to exhibitors and others, to whom Mr. Swan's revelations ought therefore to come with no degree of novelty.

The *Journal of the Franklin Institute*, in its issue of September, 1894 (Vol. cxxxviii, 825), refers to the Outerbridge and Swan processes in an article which concludes as follows:

"It may be stated, in conclusion, that the mode of procedure above described was patented by its author [Alexander E. Outerbridge, Jr.], under the title 'Manufacture of Metallic Leaf.' In his patent the inventor describes, as 'a new and improved method of manufacturing gold leaf, silver leaf, and other metallic leaf,' the above-named method of electrical deposition. As suitable mediums to support his films, he mentions copper in thin sheets, and paper, shellac, wax, etc., made conductive upon the surface which is to receive the deposit.

"For removing the deposited film from copper and paper, Mr. Outerbridge describes the use of a bath of dilute nitric acid, or of perchloride of iron. In the case of the shellac, wax, etc., alcohol, benzine and other solvents are referred to."

The patent granted to Mr. Outerbridge is No. 198,209, and is dated December 18, 1877.

The American Philosophical Society is presumably interested in questions of scientific priority, especially when that priority is American, and still further, when it is Philadelphian. As Mr. Outerbridge and I worked side by side for twelve years as assistants in the Assay department of the Mint in this city, I am glad to add my testimony towards the substantiation, if such were necessary, of the facts herein mentioned. As stated

in the beginning, Mr. Swan's process, notwithstanding its striking similarity to Mr. Outerbridge's, may be fairly original with Mr. Swan, but it was also original with Mr. Outerbridge some seventeen years before Mr. Swan appears to have made his achievement known.

The Protohistoric Ethnography of Western Asia.

By Daniel G. Brinton, M.D.

(*Read before the American Philosophical Society, April 19, 1895.*)

Many of the most weighty problems in ethnography and in the history of civilization depend for their solution on the relative positions of races and linguistic stocks in western Asia at the dawn of history. The numerous special studies which have been devoted to the archæology of this region are abundantly justified by the importance of the results obtained and yet to be expected.

It is my intention in this article to examine these studies with the aim of ascertaining what races and stocks occupied the area in question in protohistoric times, and where lay the lines of demarcation between them. It is possible that by bringing to bear upon the questions involved the general principles of ethnographic research, some light may be thrown on points still obscure. This I shall have in view when it appears applicable.

The area to be considered is roughly that portion of Asia between the thirtieth and fortieth parallels of north latitude, and west of the fiftieth meridian east of Greenwich. It includes the whole of the Euphrates-Tigris valley, Syria, Asia Minor and Trans-Caucasia.

Alleged Prehistoric Races.

The assertion has been often made that there are indications of races in this area belonging to other varieties of the human family than those discovered there in the protohistoric period.

These statements require to be examined as a preliminary to the study of the earliest historic peoples.

1. *An Alleged Primitive Black Race (Dravidian or Negritic).*

The theory was advanced by Lenormant that lower Mesopotamia and southern Persia were once peopled by an ancient branch of the black-skinned Dravidians of India. This opinion has of late years been defended by De Quatrefages, Oppert, Lefévre, Schurtz, Schiaparelli, Conder and others.*

The only evidence which seems at all to support such a view is the presence in the Khanate of Celat of the Brahu tribe, who have been by some classed with the Dravidas or Mundas of India. They are certainly negroid, with swarthy complexions, flat noses, scanty beard, hair black and curly, cheek bones high and face broad. Their language has undoubted Dravidian elements, the words for "one" and "two," for example, and many others. But its grammar seems to me to be much more Aryan than Dravidian. The verbal subject is a separable pronominal prefix, the nouns have declensions, and the suffixes are no longer root-words. It is probable they are merely a hybridized outpost of the Dravidian stock.† It is well to remember that they dwell on the affluents of the Indus, twelve hundred miles distant from the Euphrates, and there is no reason to suppose that they were ever nearer it.

The undersized negritic population which is found in the Andaman and other islands south of the Asiatic continent has been supposed, principally on the strength of some discoveries of negroid heads and portraitures at Susa by M. Dieulafoy, to have extended into Babylonia. But these sculptures belong to a comparatively late period, and if negritic—and their strong beards render such a supposition improbable—they are much more likely to have been of slaves or captives than of an old resident population.‡ This would also explain the somewhat negroid traits of the modern Susians.

* See De Quatrefages, *The Pygmies*, pp. 55, 56 (Eng. trans., N. York, 1895); Lefévre, *Race and Language*, p. 118; Schurtz *Catechismus der Völkerkunde*, p. 155; L. Schiaparelli, "Sull 'Etnografia della Persia antica anteriore alle Invasione ariane," in *Atti della R. Accad. delle Scienze di Torino*, 1888. The last-mentioned distinctly identifies the Brahu as the remnant of the primitive speech.

† "Synoptical Grammar and Vocabulary of the Brahoe Language," in Bellew, *Travels from the Indus to the Euphrates*. There are only three numerals in the language: 1, *asit;* 2, *irat;* 3, *musit*. The others are borrowed from the Persian. The first may be compared to the Sumerian *ash*, one. Mr. R. N. Cust, in his *Languages of the East Indies*, is doubtful about the Dravidian relationship.

‡ The theory that the beard and hair are artificial of course destroys ethnic value of any kind for these figures.

The "Asiatic Ethiopians," mentioned by Herodotus and some other early Greek writers, were not negroid. They are described as having straight hair, and it has been shown by Georges Radet that some of them at least were Semites.*

2. *An Alleged Primitive Hamitic (Cushite) Race.*

By the "Hamitic" stock, ethnographers and linguists now mean those who speak dialects of the Berber languages of northern Africa and their affined tongues, the Galla, Somali, Danakil, etc., of eastern Africa. The "Cush" of the ancient Egyptians was largely peopled by Hamites, and the oldest inhabitants of Egypt itself were probably of Hamitic blood.

The idea of locating members of this stock on west Asian soil was no doubt first derived from the book of Genesis.† That respected authority states that Nimrod, the son of Cush and grandson of Ham, settled in the plain of Shinar and built the first cities of Babylonia. This statement was eagerly adopted by the early Assyriologists, notably by Sir Henry and Prof. George Rawlinson, by Lepsius, Loftus and others. The language of old Babylon was even identified with the modern Galla, and the passage of the Hamites or Cushites across the Red Sea, by way of Arabia to the Persian Gulf, was accurately traced!‡

Another band was supposed to have entered Palestine and to have left representatives in the light-complexioned Amorites of the highlands.

It must be acknowledged that later researches have accumulated no evidence in favor of these ancient legends. Except in

* See his extended discussion of the passages in the *Révue Archéologique*, Tome xxii (1893), p. 209, *sq.*

† The genealogical list of peoples in Genesis x is often appealed to in support of theories in ethnography. That list has much interest politically, geographically and even historically; but cannot at all be accepted on questions of ethnic affiliations. Schrader, Hommel and Delitzsch have expressed the opinion that the "Cush" of Gen. x. 8, etc., refers to the Kashites of the lower Tigris, who will be discussed later. Fried. Delitzsch, *Die Sprache der Kossäer*, p. 61, note.

‡ See Prof. Rawlinson in Smith's *Dict. of the Bible*, s. v. "Chaldeans;" and Sir Henry in the notes to his translation of Herodotus; W. K. Loftus, *Travels in Chaldea and Susiana*, pp. 69, 70, 93. Lepsius' views are severely criticised by Dr. W. Max Müller in his erudite work, *Asien und Europa nach altegyptischen Inschriften* (Leipzig, 1893), p. 343. The theory has recently been developed by M. Lombard in his "Description ethnographique de l'Asie Occidentale," in the *Bull. de la Soc. d'Anthropologie* of Paris, 1890, though his connotation of the term *chamitique* differs from that of Rawlinson.

one or two possible instances in southern Arabia,* no example of a Hamitic dialect has been discovered in Asia; and Babylonian Semitic is as far from Galla as is ancient Arabic.

Principally because they are said to have been blonds, Prof. Sayce claims the Amorites as Libyans. But there are blonds in considerable numbers among the pure-blooded Arabs of the desert. Therefore this trait is not conclusive. Moreover, some of the ablest critics now believe that "Amorite" and "Canaanite" were merely ethnically synonymous terms applied to the same Semitic people.† At any rate, the Amorites, if non-Semitic, are much more likely to have been allied to the tribes north of them than to the African Libyans.

3. *An Alleged "Turanian" (Sibiric or Sinitic) Race.*

A favorite theory with many writers, notably Lenormant, Sayce, Conder, Isaac Taylor, etc., has been that the "Turanians" extended over western Asia and central and southern Europe in prehistoric times.‡

Who these Turanians were is not always clear. Prof. Sayce sometimes calls them "Ugro-Altaic," at others, "Ugro-Mongolian," by the former meaning collaterals of the Finns, Tartars and Turks (those whom I call Sibiric),§ and by the latter apparently including the Chinese.

Apart from the alleged evidence from linguistic data, which I shall consider later, scarcely anything save assertions have been offered in favor of this opinion. Before the historic invasions of western Asia by the Sibiric tribes, there is no record of their presence in Persia or west of it. There are no remnants of a prehistoric occupation by them, no existing fragments of a primitive Sibiric tongue. The only groups of Mongols now in the limits of ancient Iran, to wit., the Hasarah and

* Notably the Ekhili or Mahri in the Hadramaut. See M. de Charency's study of this dialect in *Actes de la Société Philologique*, T. I, p. 31, *sqq.* Dr. Glaser has recently obtained more material, but this has not yet been published.

† The question is impartially stated in J. F. McCurdy, *History, Prophecy and the Monuments*, Vol. I, pp. 406–408 (New York, 1894). Dr. W. Max Müller assigns strong reasons for considering the Amorites to have been pure Semites, *Asien und Europa*, pp. 230–234.

‡ The evidence in favor of this theory is fully summed up by C. R. Conder in his article, "The Early Races of Western Asia," in the *Jour. of the Anthropological Institute*, 1890, p. 304, *sq.*, and in his *Syrian Stone Lore* (London, 1886).

§ See the classification of the Asian race which I adopt in my *Races and Peoples; Lectures on the Science of Ethnography*, p. 194 (New York, 1892).

the Aimak, between Herat and Cabul, and a few others, drifted there in the mighty inundation of Ghenghis Khan in the fourteenth century of our era.*

According to their own traditions, and the concurrent testimony of the oldest Chinese annals, the present Khanates of Khiva, Bokhara and Khokan, as well as eastern Turkistan, were inhabited in the most ancient time by an Aryan population, which was conquered or expelled by the Mongol-Tartar race within the historic period.†

This is substantiated by the most recent researches with reference to the ethnic position of the ancient Asian Scythians who are located in that vicinity by the Greek geographers. They are shown to have been members of the Indo-European family.‡

It is even very doubtful that in the remote Avestan period of the history of eastern Iran the Aryans had to contend with Altaic or Mongolic hordes; for their enemies are represented as using war chariots, which were unknown to the Tartar horsemen.§ The so-called non-Aryans (*anarya*) probably were merely other tribes of Indo-European origin, of different culture and religion.‖ The peculiar arrow release of the Mongolians and their characteristic bows are not depicted on the oldest monuments, nor were they familiar to the early western tribes of Asia.¶

Physically the protohistoric peoples of western Asia nowhere display clear traits of the well-marked type of the Sibiric stock. Judged either by the portraitures on the monuments or by the cranial remains in the oldest cemeteries, they were meso- or dolicho-cephalic, with straight eyes, oval or narrow faces, distinct nasal bridges, etc.

A persistent effort was made a few years ago by the Rev. C. J. Ball to prove that the language and blood of the southern

* H. Schurtz, *Catechismus der Völkerkunde*, p. 292.

† W. Geiger, *Civilization of the Eastern Iranians in Ancient Times*, p. 18; Gregorjew, *Bulletin* of the Oriental Congress at St. Petersburg, 1876, p. 38.

‡ Bertin in *Jour. of the Anthrop. Inst.*, 1888, p. 109; Hovelacque, *La Linguistique*, p. 190, and others.

§ W. Geiger, u. s., who inclines, however, to a pre-Aryan hypothesis.

‖ Geiger points this out clearly, and it is surprising that Schrader and Jevons (*Prehistoric Antiquities of the Aryan People*, London, 1890) fail to note that *arya* in the Avesta is a religious, not an ethnic, distinction.

¶ See Prof. E. S. Morse's suggestive study on arrow releases as an ethnic trait in *Essex Institute Bulletin*, 1885.

Babylonians were distinctly Chinese.* His essays on this subject are striking examples of the misapplication of the principles of linguistic comparisons for ethnographic purposes. By the methods he adopts any two languages whatever can be shown to be related. He claims his view to be original; but eighteen years before he published it, the Rev. Joseph Edkins had printed a volume to prove that the Chinese language had its origin in the Mesopotamian plain, because the Tower of Babel stood there, near which the "confusion of tongues" took place! †

Prof. A. Boltz has lately pushed the Sinitic theory to its extreme by discovering elements of Japanese in the tongues of old Babylonia.

These opinions scarcely merit serious refutation; the more so as the whole Turanian hypothesis has distinctly weakened of late years, several of its warmest defenders having gone over to the "Alarodian" theory, which I shall consider presently.

4. *An Alleged "Ground Race" of Unknown Affinities.*

It will be sufficient to mention the notion advanced by Bertin, that in prehistoric times western Asia was peopled by what he calls a "ground race," a variety of the human species of no particular language or physical type, which he imagines once spread over the whole earth and disappeared with the advance of the higher varieties.‡ No evidence is offered for the existence of this fanciful creation of a scientific brain.

The "Stone Age" in Western Asia.

The absence of a prehistoric, aboriginal people, of a different variety from the white race, resident in western Asia, appears confirmed by archæological investigations.

Up to the present time no sufficient proof of palæolithic sites within the area I am considering has been presented. §

* Ball's articles on the subject are in the *Proceedings of the Society of Biblical Archæology*, 1889, and after.

† Rev. Joseph Edkin, *China's Place in Philology* (London, 1871).

‡ G. Bertin, "The Races of the Babylonian Empire," in the *Jour. of the Anthrop. Soc.*, 1888, p. 104, *sqq.*

§ G. de Mortillet, in his *Préhistorique Antiquité de l'Homme*, pp. 178, 288, 450, presents statements to the contrary. But the day is past when we assign a rough stone implement of "chellèen" form at once to palæolithic times. The stratigraphy is the test, and this has not been shown to justify such antiquity in Syrian caves.

Prof. Hilprecht, of the Niffer expedition, brought from the Lebanon range a collection of roughly chipped stones, but I am convinced, after examining them carefully, that they are not completed implements, but "quarry rejects," such as have often been mistaken for palæoliths, or else undeveloped forms.

In the oldest strata of Hissarlik no signs of a "rough stone" age were discovered.* In the caves of the Libanus range examined by Lartet, the oldest remains of man's industry in stone were associated with pottery and the bones of living species of animals.† Later cave exploration, when properly conducted, has everywhere in western Asia repeated this story. Only when the strata have been manifestly *remanié* by nature or man have stone implements been found in juxtaposition to the bones of extinct species.

In none of these deposits have human remains been exhumed presenting the low and presumably very ancient types of the "neanderthaloid" man, or the "pithecanthropus."

The megalithic monuments, the dolmens and menhirs of Syria and Palestine also contain pottery and belong distinctly to the polished stone period, if not to that of early metals. They have been attributed to some prehistoric, non-Semitic people; but the fact that Palgrave and Dr. d'Elyseff found just such monuments in Arabia removes the foundation for such an assertion, and assigns them to early Semitic hordes.‡

This is consistent with the Egyptian portraitures, which represent all the inhabitants of Syria (except the Hittites) with pure Semitic features.§

The conclusion from the above facts is, that from the testimony so far presented, western Asia, instead of being the birthplace of the human species, as has generally been supposed, was, in fact, comparatively lately occupied by man.

* *Verhand. der Berliner Anthrop. Gesell.*, Bd. xi, s. 275.

† Lartet, *Voyage d'Exploration à la Mer Morte*, pp. 215, *sqq.* The latest scientific explorer of the caves of Palestine is Dr. Alexandre d'Elyseff. His full text has not yet appeared, but an abstract was published in the *Bull. de la Soc. d'Anthropologie*, Paris, 1894, p. 217.

‡ Lartet, *Exploration*, etc., p. 238. He gives interesting sketches of a number of these monuments. They were doubtless sepulchral. Hoernes refers them to the "earliest age of metals;" *Die Urgeschichte des Menschen*, p. 462 (Vienna, 1892). Dr. d'Elyseff (*ubi supra*) assigns those in northern Arabia to the neolithic period. Their builders knew the ass and camel, but were anthropophagous.

§ W. Max Müller, *Asien und Europa nach altegyptischen Inschriften*, p. 229.

Members of the White Race the Earliest Known Occupants.

Excluding for the reasons above given the various alleged prehistoric races named, we are justified in saying that western Asia at the dawn of history was under the exclusive control and substantially wholly populated by the white race.

This race is that to which Blumenbach erroneously applied the name "Caucasian," by which it is still familiarly known. It is distinctively the "European," in contrast with the Asian (Mongolian, yellow), and the African (Negro, or black) subspecies. I have, however, assigned it the more correct name "Eurafrican," as its primitive home included northwest Africa as well as western Europe.*

In western Asia it was represented from the remotest historic times, as it is to-day, by branches of its three great linguistic stocks, the Aryan or Indo-Germanic (North Mediterranean), the Semitic (South Mediterranean) and the Caucasic. In a general way, the Caucasic tribes are and always have been in the north, the Aryans in the centre and the Semites in the south. The tribes which cannot positively be assigned to one or other of these stocks I shall consider later.

Lines of Immigration.

There was a time when the doctrine was general that the white race originated in central Asia, and moved westwardly into Europe and Africa.

Cogent reasons have of late led to a reversal of this opinion. The white race, as such, most probably had its "area of characterization"† in western Europe and the Atlas region (then united by a land-bridge), and moved eastwardly in two great streams, the Hamitic and Semitic branches journeying south of the Mediterranean, the Aryan and Caucasic north of it.

For a very long period the proto-Semites resided in Arabia, developing there the special traits of their languages, their ethnic character, and to some extent their early culture. Later they spread over Syria and Mesopotamia, advancing in both

*See my *Races and Peoples*, p. 103, *sqq.*, for the subdivisions of the white race.

†I adopt this excellent expression from M. de Quatrefages, and have explained it in my *Races and Peoples*, p. 94.

directions until checked by the North Mediterranean immigrants.*

The Aryans entered Asia chiefly by the Hellespont and Bosphorus. They traversed Asia Minor into Iran, where the lofty chain of the Hindu Kush turned one current to the north to Bactriana, another to the south to Afghanistan and India.†

The Caucasic tribes may possibly have compassed the Black Sea, and thus have reached their mountain homes; but the evidence, both linguistic and archæologic, is that they preceded the Aryans along the same route into Asia Minor, and originally occupied localities well to the south of their present position. The indications are that they did not reach the Caucasus until late in the neolithic period, or about the beginning of the Age of Iron, and then as refugees, driven from more favored climes to the south and southeast, and bringing with them elements of the characteristic cultures of those regions.‡

We cannot suppose a movement in the reverse direction; for, as M. Chantre well remarks: "History does not furnish a single example of a nation which has left the Caucasus to spread itself in the plains near it or in remoter regions." The mountain fastnesses were refuges, not centres of dispersion.§ The most prolonged researches in the caves of the Caucasus and in the drift of its rivers have brought to light no evidence of a really ancient occupation, no traces of an "old stone" or palæolithic condition of culture.‖

Antiquity of the Immigration.

While the general movement above outlined has been recognized by various writers, its antiquity has been surely underestimated.

* See an article by me, "The Cradle of the Semites," read before the Oriental Club of Philadelphia, and published, with a paper on the same subject by Dr. Morris Jastrow, Jr., Philadelphia, 1890.

† See the suggestive study of M. G. Capus, "Les Migrations Ethniques en Asie Centrale au point de vue Geographique," in *L'Anthropologie*, 1894, p. 53, *sqq.*

‡ This is the result of a careful comparison of the oldest artefacts from the necropoles of Trans-Caucasia. See F. Heger, in *Verhand. Berliner Anthrop. Ges.*, 1891, p. 424. M. E. Chantre believes the connection was with Assyrian culture, and an equal authority, M. de Morgan, that it was with Iranian (Morgan, *Mission Scientifique au Caucase*, Paris, 1889).

§ In the *Cong. Internat. d'Archéologie Préhistorique*, Moscow, 1892, Tome i, p. 173. This illustrates how erroneous was the notion of Blumenbach that the Caucasus was the cradle of his so-called "Caucasian," *i. e.*, European white race.

‖ Chantre, *u. s.*, Tome ii, p. 82, *sqq.* Compare also the article of F. Bayern, "Ueber die ältesten Gräber in Kaukasien," Sup. to *Zeitschrift für Ethnologie*, 1885, and the recent researches of Rösler and Belck in the *Verhand. Berliner Anthrop. Ges.*, 1891, pp. 213, *sqq.*

When we calculate the age of culture in Mesopotamia and Syria, and especially the time required to develop the extensive changes in the languages and dialects of all three stocks, it is safe to say that the appearance on Asian soil of the northern and southern streams could not have been later than ten or twelve thousand years B.C. We need fully this much elbow-room to account for the changes, physical, cultural and linguistic, in the stocks themselves, and by taking it many difficulties will be avoided.*

Late researches tend strongly in this direction. It has been shown that the Georgian dialect of the Caucasic stock has changed almost nothing in grammar or vocabulary in a thousand years;† the age of the *gāthās*, the oldest songs of the Avesta, has been carried back far beyond the former computations;‡ and in spite of vigorous opposition, the opinion is gaining ground that the more ancient portions of the Rig Veda must be assigned to a period about four thousand years B.C.§ City-building nations lived on the Euphrates six thousand years before our era, as is indicated by the alluvial deposits.‖ And other evidence to the same effect is constantly accumulating from various directions.

No position could be more untenable than that recently maintained by Col. A. Billerbeck that the Aryans entered Asia about the thirteenth century B.C., "coming from the north around the Caucasus," (!)¶ into western Asia, and did not become the leading race in Persia until about 800 B.C., a land which he believes was before that date inhabited by a "Mongolian" population. Such views are directly against the evidence. The light which has been thrown on the culture of the Indo-Iranians anterior to that remote period when they separated, by the linguistic researches of Schrader, show that even then they had domesticated those

*As that advanced by Schiaparelli, that we cannot suppose Iran to have been uninhabited when powerful and organized nations dwelt on the Indus and the Euphrates. There is no reason why it may not have been peopled by Aryans as early as these localities were by Dravidians and Semites. Cf. Schiaparelli, *ubi suprá*, p. 316.

†See the admirable work of R. von Erckert, *Die Sprachen des Kaukasischen Stammes*, pp. 288, 300 (Vienna, 1895).

‡W. Geiger, *ubi suprá*, Introduction.

§I refer to the arguments of Prof. Jacobi, of Bonn, and the Hindu, Bal G. Tilak. For a very one-sided criticism of these, by Prof. Whitney, see *Proceedings of the Amer. Oriental Society*, March, 1894, p. lxxxii.

‖Dr. J. F. Peters, in *Science*, March 8, 1895.

¶"Von Norden, um den Kaukasus herum, nach West Asien." Billerbeck, *Susa*, p. 63.

thoroughly Asiatic animals, the camel and the ass, and had lived long enough in their Asian home to develop many local culture-words, which each branch preserved after their division.* Years ago the acute student of antiquity, Vivien de St. Martin, pointed out that throughout the Avesta there is not an instance of a word, proper name or culture-reference which distinctly indicates association with any Turanian or Dravidian nationality.† This significant statement has borne the test of criticism, and is well-nigh conclusive in its bearing on the question at issue.

We may now proceed to scrutinize more closely each of the three great divisions of the white race who dwelt in western Asia in prehistoric and protohistoric times.

The first to arrive, as I have intimated, I take to have been

The Caucasic Stock.

The clear definition of this stock is one of the most recent conquests of anthropologic science, and is due chiefly to the untiring studies of Gen. R. von Erckert, of the Russian army.‡ He has proved the fundamental unity of the three great groups of the Caucasic languages, the Georgian, the Circassian and the Lesghian. In these groups there are about thirty dialects or languages, and they have not yet been sufficiently analyzed to decide which is nearest to the original tongue, the common *Ursprache*.

The morphology of the stock is strictly its own, severing it as widely from the Ural-Altaic tongues as from those of Aryan or Semitic complexion. It is an entirely independent linguistic family.

The Georgian is the southernmost group, being spoken in Trans-Caucasia about Tiflis. It is divided into several branches, which are scarcely more than dialects, the Grusinian, the Imerian, the Mingrelian, the Lasian and the Svanian. The structure of these is not agglutinative in the proper sense of the word.

* Schrader and Jevons, *Prehistoric Antiquities of the Aryan Peoples*, p. 267, etc. (London, 1890).

† *Geographie du Veda*, Paris, 1859, etc., quoted by L. Schiaparelli in his article already quoted, "Sull 'Etnografia della Persia antica anteriore alle invasione ariane."

‡ *Die Sprachen des Kaukasischen Stammes* (Vienna, 1895). The grouping of the Caucasic languages is not yet settled. Erckert inclines to a provisional, geographical one.

They abound both in prefixes and suffixes, but these are not, or are rarely, independent themes. The same affix may be used either as a prefix or a suffix. The verbs have a direct conjugation in which the theme is verbal, and another in which it is nominal (*e. g.*, "I see it," and "the seeing it is to me").*

The physical type of the Caucasic stock is that of the pure white race, the brunette variety. The modern skulls are broad (brachycephalic), but those from the most ancient cemeteries are much less so, proving that a change has taken place in this respect during historic times.† The stature is slightly above the European average. The hair is dark and wavy, beard abundant, eyes straight and dark, nose prominent. Handsome men are frequent, and the beauty of the women is famous the world over.

In the opinion of M. Chantre—an archæologist who has most thoroughly investigated the subject—the Georgians have resided in their present territory at least since 2000 B.C.‡ This is corroborated by the development of their dialects. Their own legends, which trace their ancestry back to Kartvel, fourth in descent from Noah, are worthless.§

Whenever it was that they reached Trans-Caucasia, they certainly brought with them an advanced culture. The oldest cemeteries belong to the dawn of the Iron Age (the Halstatt epoch); a few burial mounds may date back to the Copper Age, but none are in the exclusively Stone Age.‖ This proves, as already suggested, that their earlier development was in another clime, in some more southerly latitude, where they were in contact with an older civilization, which must have been either Aryan or Semitic.

* Fr. Müller, *Grundriss der Sprachwissenschaft*, Bd. iii, Abth. i, s. 216, *sq.*

† Dr. R. Virchow, *Verhand. Berliner Anthrop. Ges.*, Bd. xiv, s. 474–480. In the necropolis of Samthawo two-thirds of the oldest skulls are dolicho-cephalous. The modern Georgians have an index of about 81°. Many of the old skulls average as low as 73°. See on this Dr. Zaborowski, in *Bull. de la Soc. d'Anthropologie de Paris*, 1894, p. 43. This change in cranial form is doubtless owing in part to intermarriage with brachycephalous stocks, but partly also to persistent antero-posterior deformation finally exerting hereditary influence.

‡ See his article, "Origine et Ancienneté du premier Age du Fer au Caucase," in the *Mems. de la Soc. d'Anthropologie de Lyons*, 1892, and in the reports of the International Congress of Prehistoric Archæology at Moscow, 1892. De Morgan refers the older tombs of Armenia and Trans-Caucasia to a period 2500–3000 B.C. (*Mission Scientifique au Caucase*, p. 203.)

§ They are epitomized in N. F. Rittich's *Die Ethnographie Russlands*, p. 2.

‖ Dr. Virchow, *ubi sup.*, p. 482.

Their immediate neighbors on the south were the inhabitants of the basin of Lake Van. These were the "Urartu" of the Assyrian texts, the "Alarodi" of Herodotus, dwelling near the Ararat of the Hebrew Scriptures. They spoke a non-Semitic language, which by Sayce, Lehmann, Hommel and others has been classed with the Georgian. This is probable, although it was certainly more or less Aryanized when we first become acquainted with it (about 800 B.C.).* The native name of the land was *Biaina*, and of the people, *Chəldi*, after their chief god Chaldis. From this they are designated in ancient geography as the "Pontic Chaldeans," to distinguish them from those in Babylonia (the *Kash du*). A sharp culture-line, however, divides these Chaldi from the Georgians. Their mode of burial was quite different, and their proper names cannot be analyzed from the Grusinian lexicon. This line crosses the river Araxes above Ordubad, and is easily traced by the existing remains.†

Another people claimed, with some show of reason, to have belonged to this family were the Mitani, who occupied the great bend of the Euphrates about 37° N. Lat.‡ Certain proper names of divinities and affixes are common to them and to the old Vannic language. The name Mitani itself sounds Georgian, as in that tongue *-ani* or *-iani* is an adjectival suffix (*okhro*, gold; *okhrani*, golden).

Bold attempts have been made to trace the Georgian into Europe.

It has been pointed out that Strabo mentions the Iberians and Albanians as tribes dwelling in Trans-Caucasia; and this is enough to have induced Prof. Hommel to claim that the Grusinian is related to the Albanian of ancient Illyria and to the Basque of the Pyrenees.§ As the former is a well-marked

*"Stark indogermanisirt," as Hommel says. His articles in point will be found in the *Archiv für Anthropologie*, Bd. xix, s. 251, *sq.*, and the *Zeitschrift für Keilschriftforschung*, Bd. i, s. 162, *sq.* In the latter he says that the old Armenian, the Cossæan and the Suso-Medic belonged "zweifellos" to the Georgian family. Heinrich Winkler considers the affinity of the Vannic to the Georgian is "shown to be highly probable" (*Ural-Altäische Völker und Sprachen*, p. 145).

†See an excellent article by Waldemar Belck in the *Verhand. der Berliner Anthrop. Ges.*, 1893, s. 81, *sq.* Bertin (*Gram. of the Langs. of the Cuneiform Inscrips*) gives three Vannic numerals: 1, *shushi*; 2, *tara*; 3, *shishti*. These are rather similar to the Caucasic: 1, *eshku*; 2, *heri*; 3, *shshi*.

‡Among others, Dr. Lehmann supports this opinion, *Zeitschrift für Ethnologie*, 1892, s. 130 (though with some hesitation). Compare his *Shamashshumukin*, s. 63. Others connect the Mitani with the "Hittite" tongue. To this I shall refer later.

§*Archiv für Anthropologie*, Bd. xix, s. 251.

Aryan language and the latter one whose morphology is widely different from members of the Caucasic stock, the suggestion scarcely merits serious reception. The Etruscan, which has, of course, been thought of in this connection, presents no points of positive affinity. Possibly if we knew something of the Ligurian or the pre Italic dialects, we might discover a connection. The Caucasic physical type is certainly that of the south of Europe, rather than of the north.*

The Aryan Stock.

I take it as sufficiently demonstrated that the Aryan cradle-land was in western Europe. Evidence of all kinds is constantly accumulating in favor of this opinion, and I need not rehearse it here.†

In spite, however, of the indisputable relationship of the Aryan tongues, the branches of the stock do now, and apparently always have presented several distinct physical varieties. Prof. Kollmann has claimed that there were at least four of these in prehistoric Europe.‡ Two certainly cannot be questioned. There is the blonde type, with medium or long heads, orthognathic, with fair or ruddy complexions, hair wavy and brown, red or flaxen in hue, eyes blue, gray or brown, stature tall, nose narrow and prominent, beard abundant. Such in Europe are the Scandinavians and Scotch Highlanders; and in Asia such are the Galchas and neighboring tribes, pure-blooded Iranians in the secluded valleys of the upper Oxus.§ The modern Persians, in spite of admixture, partake of it largely, and hence the name of contempt which the Turcomans apply to them, *Guzl-bash*—"red heads."

Another European type is that of the dark Celts. They are brunettes, of short stature, with round, high heads, black eyes

*The able archæologist, M. De Morgan, confuses his readers by calling the Caucasians "Turanians"—"Les Touraniens, ou blancs allophyles." He means by these the members of what I call the Caucasic branch of the white race, and the map which he gives, "Carte de l'Asie Antérieure pour l'Epoque Assyrienne," in which he marks the southern limit of the Caucasic stock by a line drawn from the mouth of the Araxes to the Amanus mountains, is, I am persuaded, quite accurate. The differences between us are in phraseology only. See his *Mission Scientifique au Caucase*, pp. 197, 202, etc.

†See my *Races and Peoples*, p. 109, *sq.*, for a condensed statement of the argument.

‡See his article, "Les races humaines de l'Europe et la question arienne," in the *Proceedings of the Congress of Prehistoric Archæology*, Moscow, 1892.

§Wm. Geiger, *Civilization of the Eastern Iranians*, p. 8.

and hair, somewhat prognathic, beard rather scanty. In protohistoric times they extended through central Europe from the Pyrenees to the Bosphorus, and included the Rhætians, Croatians, Roumanians and Dacians. The modern Auvergnats and Savoyards retain the type in its greatest purity.*

The Aryan languages are preëminently inflectional. The protohistoric members of the family in Asia were the Hellenic, the Armenian, the Iranian and the Indian (Sanscrit) groups. To these, which have been recognized by all, I would add the Celtic. All are characterized by suffix-inflections, where the augment is not a separate word, but can be used only as a grammatical adjunct to the theme.

But it is of prime ethnographic importance to note that this represents a comparatively late stage in the growth of language. Prof. Brugmann pertinently remarks: "The first foundations of inflections were laid by the fusion of independent elements. We have to presuppose a period in which suffixal elements were not yet attached to words." †

It is possible that some of the Aryan tribes at the period of their arrival in Asia still retained a condition of the common tongue in which the suffixes were loosely attached to the stem and preserved their independence as words. An Aryan language in this stage might easily be mistaken for one which is agglutinative.

The Semitic Stock.

As I have already said, the "area of characterization" of the Semitic stock is now generally admitted to have been in Arabia.

When its members began to expand from that centre towards the east and north, the configuration of the land dictated the course they had to pursue. The arid surfaces of the Arabian and Syrian deserts lay between them and the fertile Mesopotamian depression. They were obliged to follow the coast of the Mediterranean and the vales of the Syrian mountains near it for the distance of five or six degrees of latitude northward, before they could turn to the east and reach the "Stream-land" (Naharin) watered by the Orontes and the upper Euphrates (about 36° N. Lat.).

* Hovelacque et Hervé, *Précis d'Anthropologie*, p. 582, *sq.*

† Karl Brugmann, *Comparative Grammar of the Indo-Germanic Languages*, Vol. I, pp. 14-16.

It would be rash to set a specific date, even in millenniums, for this movement. But it is safe to say that Syria was reached earlier by the north Mediterranean influx than by the Semites. The dialects and languages of the latter stock are more compact, and they contain more culture-words in common than those of either the Caucasic or Aryan families *—facts which indicate longer association in their early homes. It is not likely, however, that the two streams first came into contact at any later date than 7000 B.C.

The Semitic languages are also inflectional, but by a method so unlike that of the Aryan tongues that we cannot imagine any prolonged contact in the formative stages of their structure. Instead of suffix-building, first by the attachment of independent words, and later by formative particles, the Semitic dialects have triliteral radicals which they inflect by internal vowel changes.

The physical traits of the Semites are marked and durable. The head-form is long (dolichocephalic) and the face orthognathic. The complexion, hair and eyes are usually dark, but in about ten per cent. of the stock, even where purest, as in Arabia, the complexion is blonde or reddish, with hair and eyes to correspond. The beard is abundant, and both it and the hair are curlier than in the Aryan. The nose is large, fleshy, and so peculiarly curved that it has been singled out as the most characteristic feature of the race. It is shown on the oldest Egyptian and Babylonian representations as clearly as it is seen to-day.

The northernmost extension of the Semites was defined, on the west, by the range of the Amanus mountains, just south of the Bay of Iskanderun (N. Lat., 36° 30′).† Between these and the Euphrates it is not likely that they permanently extended beyond 37° north latitude. East of that river, the range of the Masius mountains, about latitude 36° north, was their northern limit. In very early times they had probably gained control of

*The oldest forms of Semitic speech, remarks McCurdy, "can be proved by the vocables common to them all to have been the idiom of a people already well furnished with the rudimentary appliances of civilization." *History*, etc., Vol. i, p. 138.

†This is the opinion of Dr. W. Max Müller, *Asien und Europa*, etc., p. 310, and is supported by a general agreement. But the date assigned by that writer for the entrance of the Arameans into northern Syria—1500 B.C.—seems quite too recent, in view of the other elements in the case (*As. u. Eur.*, p. 233, 234).

the valley of the Tigris and its affluent, the upper Zab, nearly to the 37th parallel of north latitude and southward to its mouth. This was, and has ever been, their easternmost ethnic limit. The mighty wall of the Zagros mountains, which is described by travelers to look like an enormous buttress rising from the river plain to uphold the tableland of Persia,* and which extends with little interruption under various names in a southeasterly direction from the 38th to the 30th parallel, checked their further advance.

While the broad outlines of the locations of these stocks in western Asia are clear enough, there were a number of small nations near the border lines about whom much doubt still obtains. Some writers claim that they did not belong even to the European or White race, but to another branch of the species.

In examining them I shall begin with

The Proto-Babylonians.†

The region near the mouths of the Tigris and the Euphrates (at that time emptying separately into the Persian Gulf) was occupied six thousand years ago by the Sumerians and Accadians on the west, the Elamites and Ansanians on the east, the Kashites adjoining the latter to the northwest, and the Proto-Medes, adjacent to these, in the eastern highlands.

What we know of the relationship of these tribes has been derived from a comparison of the remnants of their languages, and that this has not led to positive results will be clear from the following comparison of opinions:

1. The Sumerians, Elamites, Kashites and Proto-Medes spoke dialects of one language, probably related to the Alarodian or Georgian stock (Hommel, Jensen, Billerbeck).‡

2. The Elamites, Kashites and Proto-Medes were of one speech, while the Sumerians belonged to a totally different stock (Eb. Schrader, Weisbach, McCurdy). §

* Bellew, *From the Indus to the Euphrates*, p. 7. The observations of this author on the disposition of the mountain chains of Persia as desecting the lines of early migration and acting as barriers in some instances, are well worth study.

† For valuable suggestions and references in this part of my subject I am under obligations to Profs. H. V. Hilprecht and Morris Jastrow, Jr., of the University of Pennsylvania.

‡ Hommel, *Zeitschrift für Keilschriftforschung*, Bd. i, s. 161, 330; Billerbeck, *Susa*, s. 26; Jensen, *Zeitschrift für Assyriologie*, 1891.

§ Schrader, "Zur Frage nach dem Ursprunge der altbabylonischen Cultur," in the *Abh. K. P. Akad.*, Berlin, 1884; Weisbach, *Die Achämeniden Inschriften zweiter Art* (Leipzig, 1890).

3. The Elamites, Proto-Medes and Ansanians were of one tongue. The Sumerian was totally distinct, as was the Kashite, the latter possibly having Aryan affinities (Hilprecht).*

4. The Kashite (to be distinguished from the Cossæan) was Semitic, as was the Accadian. The Sumerian was an independent stock (Lehmann).†

5. The Kashite, identical with the Cossæan, was nowise related to either Semitic, Sumerian, Elamitic or Medic (Delitzsch).‡

The "Sumerian" Question.

In striking contrast to the above opinions, Prof. Joseph Halévy, of Paris, has for twenty years contended that there never was a Sumerian language, and that all which has been written about it is a tissue of errors. The natives of Sumer, he maintains, were pure Semites.§

This opinion claims the more attention as these alleged Sumerians, according to various eminent scholars, were the fathers of the Babylonian culture, the creators, therefore, of perhaps the oldest civilization of the world. Consequently, the utmost interest attaches to their ethnic position.

Prof. Sayce has recorded himself in these strong terms: "The science, the art and the literature of Babylonia had been the work of an early people, and from them it (*sic*) had all been borrowed by the later Semitic settlers of the country."‖ In a similar strain, Schrader asserts that the Sumerians were the founders of Babylonian culture, and that whatever else they might have been, they were positively *not* Semitic;¶ and Paul Haupt has emphatically stated that to this certainly non-Semitic people, "the whole culture of western Asia must be traced."**

* Prof. Hilprecht acknowledges, however, that the Kashitic and Elamitic proper names have much in common. *Assyriaca*, p. 95.

† Lehmann adds further and needless confusion to the question by applying the term "Accadian" to the Semitic language of Babylon, and confining the "Kashites" to the Semitic inhabitants of Elam. See his *Shamashshumukin, König von Babylonien*, pp. 57, 100, etc. (Leipzig, 1892).

‡ Delitzsch, *Die Sprache der Cossäer*, Leipzig, 1884.

§ Of the numerous articles of Halévy it will be sufficient to refer to his "Aperçu grammatical de l'Allographie Assyro-Babylonienne" in the *Proceedings of the Sixth International Congress of Orientalists*. He there sets forth with entire clearness the method he advocates.

‖ *Introduction to the Science of Language*, Vol. i, p. 3.

¶ Schrader, *Zur Frage*, etc., p. 49.

** Haupt, "Die Sumerisch-Akkadische Sprache," in the *Fifth Internat. Orient. Cong.*, p. 249. This distinguished Assyriologist informs me that he has not changed his opinions in this respect.

Halévy's point is, that what has been supposed to be Sumerian epigraphy is nothing more than another method of writing Babylonian Semitic, an "allography," or a secret writing, a "cryptography," used by the priests. The Sumerian graphic method was chiefly ideographic, or, when phonetic, it was rebus-writing similar to that which is found so well marked in America, and which I have named "ikonomatic" writing.*

His explanations, which I cannot enter upon further, are extremely plausible, and evidently have been making headway of recent years. Distinguished Assyriologists, such as Stanislas Guyard and Fr. Delitzsch,† have publicly announced their acceptance of them. Careful historians, such as McCurdy, have been convinced they are right.‡

The reasons are obvious. More and more Semitic elements are recognized in the alleged "Sumerian," until one of the sincere believers in it, Dr. Heinrich Zimmern, has expressed his doubt that there is a single "pure" inscription in the tongue;§ and another, Dr. Hugo Winkler, avers that it was already a dead language long before King Gudea's time, and none of the scribes could write it correctly.‖ If this be so, how can anything like a correct grammar be extracted out of their blunders?

Other adversaries of the Sumerian doctrine have pointed out the theory of such an early people overpowered by a foreign population, which absorbed its culture while preserving intact its own tongue, is, as the eminent Assyriologist, Mr. George Smith, long ago said, "without a parallel in the history of the world."¶ In every recorded instance, when a tribe has conquered another of higher culture and adopted its civilization, the language of the conquered appears in that of the conqueror in numerous loan-words borrowed to express the new ideas obtained; but, with few and doubtful exceptions, nothing of the

* See my *Essays of an Americanist*, p. 213, and *Primer of Mayan Hieroglyphics*, p. 13.

† Delitzsch gives his reasons in detail in his *Assyrische Grammatik*, pp. 61–65 (Berlin, 1889).

‡ *History, Prophecy and the Monuments*, New York, 1894.

§ Zimmern, *Babylonische Busspsalmen*, p. 7 (Leipzig, 1885). He asserts that such a graphic method as the Sumerian could not have arisen in a Semitic tongue.

‖ Winkler, *Geschichte Babyloniens und Assyriens*, p. 53 (Leipzig, 1892). Gudea may be placed at the most recent date, about 2750 B.C. Prof. Sayce is more cautious. He says: "The Accadian (*i. e.*, Sumerian) had ceased to be spoken before the seventeenth century B. C." *Introd. to the Science of Language*, Chap. i.

¶ *Assyrian Discoveries*, p. 449 (New York, 1875).

kind appears in Babylonian Semitic.* What is not less significant, the inscriptions themselves are entirely silent about any such conquest.†

Furthermore, professional comparative linguists have been nonplussed at the strange features of the alleged Sumerian. Its friends at first wished to class it with the "Turanian," especially the Ural-Altaic, languages. The "Finno-Tartar" was a favorite group. But specialists in the Ural-Altaic tongues unanimously declared that any such connection was an "absolute impossibility."‡ Then recourse was had to the "Alarodian" and the Dravidian; but with no better success. So that finally the conclusion they were driven to was, that it was an independent stock by itself, without affinity, like the Basque, or, perhaps, the Etruscan.

There is nothing impossible in this. Historically, such isolated examples are numerous. But the difficulty lies in the alleged forms of the language themselves. They seem so uncouth as to cast doubts on the whole theory. One word will have more than fifty different meanings assigned it; the system of affixes is most capricious; its supposed system of "vocalic harmony" is unexampled in any other tongue; it omits a number of sounds absent also in Semitic—a suspicious coincidence; and so many disparities in its grammar have to be explained away by assertions of "impure" and "dialectic" texts that the whole assumes an air of uncertainty.§

In view of such difficulties the question is urged, Are not the supposed affixes merely the phonetic determinatives of ideograms, which are themselves used sometimes for their ideographic, sometimes for their ikonomatic values, just as we find them in the Mayan hieroglyphs of Central America? Or, if there is a *fond* which is non-Semitic in the Sumerian (a likely enough supposition), do not the above facts show that it is im-

* A supposed instance is *egal*, palace, literally "great house" (*e*, house, *gal*, great, in "Sumerian"). But may not the few expressions of this kind, as well as the names of gods, Nergal, Anu, etc., merely be borrowings from neighbors?

† Smith, *ubi suprâ*.

‡ Prof. Donner, of Helsingfors, has shown that no connection can exist between the Sumerian and any of the five stocks of the Ural-Altaic languages. See *Proc. Fifth Internat. Orient. Cong.* A not less competent authority, Dr. Heinrich Winkler, says that it is "absolut unmöglich." *Ural-Altäische Völker und Sprachen*, p. 169.

§ Delitzsch, *Assyrische Grammatik*, *ubi suprâ*.

possible, in the avowedly corrupt condition of the inscriptions, to construct a sane grammar from such *disjecta membra?*

A careful study of the human faces on the oldest Babylonian monuments seems to tend strongly in favor of the Semitic theory. In the excavations at Tello and Niffer we have well-drawn portraits of the people who lived on the Sumerian plain six thousand years ago. To my own eye, they belong wholly to the white race, and frequently unmistakably to its Semitic branch. This also is the conviction of so eminent an ethnographer as Fr. Ratzel. In his discussion of the subject he writes: "All of them, even the common people, the captives and the eunuchs, present the Semitic traits. Not one in the most remote degree approaches the Turanian type." * All the professed physical anthropologists who have examined the ancient portraitures, without prejudice, have arrived at this same conclusion.

Even if there was a Sumerian language, related or not to the Susic, it by no means follows that those who spoke it were the authors of the ancient culture. On the contrary, there is evidence the other way. The primal centre of progress was not in Sumer, not among the litoral people of the Gulf, but up the river, far inland. As McCurdy observes: "We can have no hesitation in vindicating for the region north of Babylon, the claim put forth in Genesis, that the seat of the earliest civilization was the place of the parting of the rivers." †

A curious bit of linguistic evidence illustrates this. The earliest Babylonians knew no metal but copper, and used it only for ornaments. When they first became acquainted with pearls and adopted them as ornaments, they called them "fish-copper," *i. e.*, ornaments from fishes. This shows that they were an inland people.‡

* Friederich Ratzel, *Völkerkunde*, Bd. iii, s. 739 (Leipzig, 1888). Lehmann, on the other hand, cannot see anything Semitic in the faces from Tello! (*Shamashshamukin*, p. 173). It is enough to say that they have full, strong beards, abundant curly hair, nose prominent and curved, the bridge raised, eyes straight, skull symmetrical and arched, in order to satisfy any somatologist.

† *History, Prophecy and the Monuments*, Vol. i, p. 124. S. Reinach, a most competent authority, declares that the most ancient Babylonian art "n'est pas Égyptisant," but arose independently. *Revue Archeologique*, 1893, p. 104.

‡ Haupt, in his article, "Wo lag das Paradies?" in *Ueber Land und Meer*, 1895. The copper from Tello is entirely pure, without a trace of tin. It doubtless came, as Virchow maintains, from deposits of this character in Trans-Caucasia. *Verhand. Berliner Anthrop. Ges.*, Bd. xix, p. 336.

According to Lehmann, however, the people at the parting of the rivers, the Akkads, were Semitic;* and Zimmern, who believes them Sumerians, acknowledges that they spoke a "younger," *i. e.*, more Semitized dialect.† This seems to intimate that if there was a Sumerian people, its culture was learned from an earlier inland Semitic nation, and not the reverse, as Sayce and others above quoted have maintained. This supposition, it appears to me, would explain away more of the difficulties in the case than any theory yet offered; and I do not remember that it has heretofore been suggested.

The Elamites, Kashites, Ansanians and Proto-Medes.

As will be seen above, the consensus of opinion is in favor of considering these as branches of one stock.

The main difficulty is with the Kashites (Kashshu). Their territory adjoined Elam, and just about where it was situated Herodotus locates a region "Kissia," and Strabo and Pliny, a free, mountain bandit tribe, the Cossæi. The effort has been made to distinguish between these; but the identities of both name and location are too complete to admit reasonable doubt but that the same people was intended.‡ The Kashites are described as mountaineers living in tents, just as Strabo depicts the mode of life of the Cossæi.

The ancient inscriptions in the various dialects of this stock, to wit, the Susic, the Neo-Susic, the Ansanian, the Apirian and the Proto-Medic, are comparatively numerous, but it must be

* *Shamashshamukin*, p. 57.

† What is known as the *g* dialect. Zimmern, *Babylonische Busspsalmen*, p. 7. The myth of the culture-hero, Oannes, half man, half fish, rising from the waters of the Persian Gulf, has, of course, no historic value, any more than that of Ea, the marine god, who created the first man.

‡ Friedrich Delitzsch asserts that the proper names in the Proto-Medic inscriptions, "fast unverkennbar arisches Gepräge tragen" (*Die Sprache der Cossäer*, p. 49). Dr. Hugo Winkler says that there is "kaum eine andere Möglichkeit vorhanden," than that the Kashites belonged with the Medes and Elamites; *Geschichte Babyloniens*, p. 78. McCurdy, reviewing the evidence, decides this is so, "in all probability." *History*, etc., p. 143. They ruled Babylonia six hundred years and their names do not seem to be Semitic, except where such were adopted. Their name for Babylon was *Karduniash*. Gesenius long ago suggested that the Chaldees might be "the Chardim," allied to *Kard*, *Kurd*, names applied to Aryan peoples, derived from old Persian *Kard*, Ossetic, *Khard*, etc., the ancient Aryan term for the sword or dagger, and also for iron (Schrader, *Prehistoric Antiquities of the Aryan Peoples*, p. 224). There was a tribe, the Kaldani, among the Kurds, who claimed to be lineal descendants of the ancient Chaldeans (Loftus, *Travels*, p. 99). What if the primitive Babylonian civilization should turn out to be of Aryan origin after all?

acknowledged that little progress has been made in their decipherment. The "second column" of the great Behistun inscription is held to be Proto-Medic (Neo-Susic). It is described as a tongue employing suffixes only, with at least four well-marked tenses, and with a kind of declension of nouns.* It has been declared to be "non-Aryan and non-Semitic," but there is nothing in its morphology as described to exclude it from the Aryan family.

It has been the custom with most Assyriologists to take for granted that all the tribes mentioned, as well as others inhabiting Elymais and Media in early days, as the Parsua, Anduia, Namri, Ellipi, etc., were neither Aryan nor Semitic. In this spirit Dr. Winkler, in his lately published History asserts that it was not until the reign of Psalmanasar II (about 850 B.C.), that the Aryan Medes (the Western Iranians) appear in Semitic history, their predecessors in the region having been non-Aryan.†

It is difficult to see any sufficient grounds for such an assumption. The Cossæi and their northern neighbors, the Mardi, whom Strabo describes, were certainly Aryans, and if the Kasshu were the ancestors of the former, they, too, were of Aryan lineage. The Elamites of "Shushan the palace" maintained their power till a late date; their descendants were the Uxii of the Alexandrinian conquest; and these were surely not of an allophyllic stock. They were either Semitic or Aryan. A thousand years B.C. the powerful and warlike Minnean nation mentioned by the prophet Jeremiah was on the southern shore of Lake Urumia, and that they were of Aryan speech is attested by such names of their kings as Iranzu, Ulusunu, etc.‡ The theory which has been advanced by some that the Ossetes of the Caucasus, who speak an archaic Aryan tongue related

*F. H. Weisbach, *Die Achämenidenischen Inschriften zweiter Art*, p. 46 (Leipzig, 1890). Inscriptions in Neo-Susic date between 1100 B.C. and 370 B.C. Weisbach calls the language in which they are written "Finno-Tartaric, richly mixed with Aryan words." *Id.*, p. 11. On the other hand, Dr. Heinrich Winkler, an excellent authority, formally denies that it can be classed with any Ural-Altaic language. *Ural-Altäische Völker und Sprachen*, p. 169. As Weisbach has shown the linguistic unity of Ansanic, Susic (Elamitic), and Neo-Susic (old Medic) in his *Ansanische Inschriften*, 1891, p. 34, this applies to the whole group.

† *Geschichte Babyloniens und Assyriens*, s. 242.

‡ *Jeremiah*, chap. li, ver. 27. An admirable article on "Das Reich der Mannäer," by Waldemar Belck, may be found in the *Verhand. Berliner Anthrop. Ges.*, 1894, p. 479, *sqq.* He does not identify their ethnic relations, but to me the proper names admit of no doubt that they were Aryans.

to Iranian, were in fact descendants of the Proto-Medes, driven from their southern homes, is deserving of respectful consideration.*

Whether the Guti and the Lulubi who possessed the valley of the Tigris on the east of the stream (from Lat. 34° to Lat. 37°) belonged with the Susic group, the material is too scanty to decide. Their writing was in Babylonian, and their royal names largely Semitic, but neither of these facts is conclusive.† While Prof. Hilprecht has classed them with the Semites, Oppert has suggested, not without some show of reason, that the name "Guti" has an Aryan sound, like Gothi, the Goths, and therefore that the tribe itself may have been of this blood.‡

The vocabularies of these languages might be supposed to give definite information concerning their relationship. The material in the Kashite, Susic and Medic is, however, too scanty to admit of satisfactory comparison. Of the Sumerian, at least one-third the words are acknowledged by believers in the tongue to be of Semitic origin. Others, as *balag*, axe (Greek, πελεχυς), *gushkin*, gold (Armenian, osχi), are admitted to be Aryan. To these, it seems to me, should be added the well-known word *tur*, son, which is also Susic, and belongs in the oldest *gāthās* of the Avesta.§

The numerals, except in Sumerian, have been very imperfectly ascertained. The following lists will serve for comparison:

	Sumerian.	Assyrian (roots).	Indian.	Georgian.
1.	*dish, ash,*	*ahaa,*	*eka,*	*ar, arthi.*
2.	*min, man, dab, tag, kash,*	*shan,*	*dwa,*	*ori, dziri.*
3.	*pish, esh, ush,*	*salash,*	*traj,*	*sami, sumi.*
4.	*lim, lam,*	*arbā,*	*tshatrar,*	*othχi.*
5.	*á, ia,*	*hamis,*	*pantcha,*	*χuthi, χut.*
6.	*ash,*	*shash,*	*sas,*	*ekhuei, uskhwaash.*
7.	*imin,*	*sib,*	*saptan,*	*shwidi.*
8.	*us, sa,*	*sham'n,*	*aslan,*	*rwa, ara.*
9.	*ilim,*	*tish,*	*nawan,*	*txra.*
10.	*u,*	*isir,*	*dasan*	*athi, withi.*
20.	*nish, shana, mán,*	*isrā,*	*wi-sati,*	*otsi* (=2 × 10).

* *Mems. de la Société d'Anthropologie de Lyons*, 1891.

† Winkler believes that the Guti had a tongue of their own, but wrote in Semitic. *Geschichte Babyloniens*, p. 82. Hilprecht gives reasons for holding that Semitic was the native language of both Guti and Lulubi. *Old Babylonian Inscriptions*, pp. 12-14 (Philadelphia, 1894).

‡ *Revue Archæologique*, 1893, p. 363.

§ In the Avesta, the Tūra people are Iranians (not Turanians). See W. Geiger, *ubi supra*, p 32. In Persian legend Tūr and Era were brothers, sons of Frēdūn, the founder and father of the Iranian tribes. The Armenian *os-t-r*, son, preserves the radical. The first syllable corresponds to the Greek υς. The second probably defined the oldest son, and hence came to have the sense of chief, prince. This analogy has been suggested to me in part by Prof. Hilprecht.

A few common words taken from the tongues mentioned, with their correspondents in the Caucasic and Brahu dialects, will show how slight is the lexical similarity between them.

	Sumerian.	Cossæan.	Susic or Ansanic.	Hittite.	Georgian.	Lesghian.	Brahu.
Man,	*lu,*	*mali,*	*ruh,*		*mare, katsi,*		*bandagh.*
King,	*lugal,*	*ianzi,*	*sunkik, zunkuk,*	*siris.*			
Lord,	*u,*	*buri, ubri,*			*thavad.*		
Servant,	*eru,*	*meli, kukla,*					
Son,	*tur,*		*shak,*	*s t-r, sis,*	*arsh, ush,*	*darga,*	*mâr.*
Child,	*du, dumu,*	*ulam, sim mash,*			*bashi,*	*bere,*	*chunaka.*
God,	*dingir,*	*bishu,*	*nap,*		*ghmerthi,*	*bishi.*	
Heaven,	*ana,*	*ilulu, dagigi,*			*ca,*	*oala.*	
Star,	*mulu,*	*dakash,*			*mariczi,*	*iri,*	*istar.*
Head,	*sag,*	*barhu,*			*thav,*	*bik, kil,*	*katum.*
Foot,	*gêr,*	*hameru, saribu,*			*fexi,*	*gel,*	*nat.*
Land,	*kur, ki,*	*iash,*	*murun,*		*mitca,*	*antza,*	*mish* (place).
Wind,	*gêr, imi,*	*turuhna,*			*khari,*	*huri,*	*taho.*
Bow,	*pan,*	*shir,*			*shvildi,*	*derga,*	*bil.*
House,	*e,*				*saxl,*	*khol,*	*ura.*
Moon, Month,	*iti,*				*piri,*	*batci,*	*tú.*
Name,	*mu,*				*saχeh.*		
Great,	*gal,*			*m-s-s,*	*didi, gangal,*		*balo.*
Hand,	*shu,*		*kurpi,*		*χe,*	*zab,*	*dû.*
Nose,	*kir,*		*shimme,*		*cxind,*	*me'er,*	*bamas.*

In such ethnographic questions the elements of historical connections and duration of time enter as significant factors. For that reason I insert the following synoptical table of

Protohistoric Babylonian Chronology.*

B.C.

4000. King Ur-Ninâ at Lagash (Tello).
3850. Alusharshid conquers Elam.
3800. Sargon I rules central and southern Babylonia and Elam.
3750. Naram Sin, his son, at Sippar.
3000. Ur bau rules at Lagash.
2800. Supremacy of the Kings of Ur.
2750. Gudea (Nabu) rules at Lagash.
2350. Babylonia is conquered by the Elamites.
2300. Abraham departs from Ur.

*The dates have been kindly revised for me by Prof. Hilprecht. They may be regarded as the minimal which can be assigned.

B.C.
2250. The Elamites, under Chedar-laomer, enter Palestine and are defeated.
2250. Rim Sin, last king of Sumer and Accad.
2240. Chammurabi expels the Elamites and rules both north and south Babylonia.
1730 to 1140. A dynasty of Kashite kings rules at Babylon.
1350. Babylonia is conquered and reduced to a tributary by the Assyrians.

No one can glance over this table without being impressed with the long and close connection which the Elamitic and Kashitic tribes had with the Babylonian Semites. This must have left deep ethnic traces on all three stocks.

The Anatolians (Hittites).

The region included in Cappadocia, Galatia, Cilicia and western Armenia was known to the Babylonians from very early times as *mat Hatte*, "the land of the Hittites," a people who bore the same name in the Egyptian documents, *Heta*.* They were non-Semitic, but their precise affiliations have not yet been decided. They had a syllabic, hieroglyphic writing, which probably arose in Cilicia,† and which has been in part interpreted, but not yet sufficiently for extended comparison.

It is almost certain that the same people extended westward through Lycaonia, Pisidia, Lycia, Caria and Lydia;‡ that is, along the whole south coast of Asia Minor to the Ægean sea, and northward to the boundaries of Phrygia and Mysia, which were inhabited by tribes of Hellenic origin.

This southern family has been pronounced by Sayce to be of "Mongolian" connections; by Hommel and also at times by Sayce to be "Alarodian," *i. e.*, Georgian; by Pauli and Tomaschek to be a wholly independent linguistic stock, to which the

*The earliest reference to the Hittites in the annals of Mesopotamia is to a conquest of Akkad by "the king of 'Hatti" (or 'Hati), about 3800 B.C. See authorities quoted by de Morgan, *Mission Scientifique au Caucase*, p. 193. This author believes that about 4000 B.C. the "allophylic white stock," *i. e.*, the Caucasic peoples, overran much of western Asia. *Ibid.*, p. 197.

†Dr. W. Max Müller claims that it certainly did. *Asien und Europa*, etc., p. 350.

‡The Philistines who invaded Palestine towards the close of the second millennium B.C. quite certainly belonged to this stock, and not to the Cretans, as has lately been reasserted by Mr. Arthur J. Evans (*Proc. Brit. Soc. Adv. of Science*, 1894, p. 776. Compare Dr. W. M. Müller, *u. s.*, p. 337, *sqq.*). There were never any Hittites proper (*i. e.*, from Cappadocia) settled in Palestine. The Orontes marked their furthest southern limit. *Ibid.*, p. 224.

former gives the name "Pelasgian," and argues that its European connections were the Pelasgi and the Etrusci.* On the other hand, Fr. Müller, Mor. Schmidt, G. Radet and P. Jensen have concluded that it is some remote, not clearly defined, member of the Aryan family.† While J. Halévy, on the strength of the inscriptions from Sindjirli, has claimed the Hittites who once lived in that region as Semites.

Recent archæological researches in Paphlagonia present evidence that before the arrival of Greek colonies from the west this territory was peopled by the same stock; and at the height of their power they may have controlled a large portion of the eastern shores of the Ægean sea. This was about 1200–1500 B.C.; and it has been argued from a variety of evidence that near the former date they were conquered and scattered or absorbed by their Semitic, Egyptian and Hellenic foes. Prof. Ramsay and others have identified them with the Amazons of the Homeric legends on reasonably good grounds ‡

It is quite likely that *mat Hatte* was a very vague phrase to the Assyrian mind; and it is wiser not to employ "Hittite" as an ethnic term. It has been proposed (by whom first I know not) to designate collectively the tribes above named as related, by the term "Anatolians," from the ancient name of Asia Minor; and I adopt this appropriate suggestion. Perhaps some of the easternmost and southernmost of the so-called Hittites did not belong in the Anatolian group, but those in most of Cappadocia and Cilicia in all probability did.

At various times, after and probably before the dawn of history, the Anatolian group proper extended its conquests southward; and it is the opinion of Hoernes§ and others that they were the pre-Semitic inhabitants of the whole of Syria. It is even possible, as Mariette and Hilprecht‖ have suggested, that the Hyksos dynasty of Egypt in the second millennium B.C. was an advanced outpost of the group, though this at

* Pauli, *Eine Inschrift von Lemnos*, p. 79; Tomaschek, *Die Urbevölkerung Kleinasiens*, in the *Mittheilungen* of the Vienna Anthrop. Soc. for 1892.

† Dr. Jensen's article was published in the *Sunday School Times* (Philadelphia), April 1, 1893.

‡ See a series of articles on "Die Paphlagonischen Felsengräber," by Lt. von Kannenberg, in the *Globus*, Jan. and Feb., 1895, especially p. 124, note.

§ Dr. Moritz Hoernes, *Die Urgeschichte des Menschen*, p. 454 (Vienna, 1892).

‖ Hilprecht, *Assyriaca*, p. 130 (Boston, 1894).

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present rests as a surmise only. That the Kashites and kindred tribes on the lower Tigris were distant members of the same group has been suggested by Hommel and Hilprecht, but with the material difference, that the former defends the connection with the Caucasic, the latter with the Aryan linguistic stock.

When we combine what we know of the physical type and the language of this ancient people there would seem to be evidence enough to assign it its ethnic position.

The type has generally been studied from the local monuments and the Egyptian records. The portraitures on the latter, especially of enemies, are often either conventional or caricatures. When we see the Hittites shown with "yellow or red complexions, receding foreheads, oblique eyes, protruding upper jaws and high cheek bones," * and all very much alike, we may be sure that both motives were present. The delineations on their own monuments are quite different and much higher, more Aryan, in character.†

It is a mistake to suppose that the so-called Hittite art was altogether borrowed from their Semitic neighbors. While the old Chaldean influence is visible in it, there is also a marked element of originality which should not be overlooked. The motives of the latter constantly recall Aryan inspiration and forms.‡

More trustworthy than sculpture are the bones from the oldest graves of the region. In examining these, Dr. von Luschan made an interesting discovery. He found that a peculiar type in early times extended over southern Asia Minor, from the Ægean east to the Euphrates, and northeast into Armenia. The skulls were remarkably broad and high, and the bones showed a people of short stature. In other words, he discovered just the type of the globular-headed, short Celts of Central Europe. He went further. He found that in the more sparsely inhab-

* See McCurdy, *History, Prophecy and the Monuments*, Vol. I, p. 193.

† A number of them are given from various sources by W. Max Müller, *Asien und Europa*, pp. 325–340. They are generally painted with reddish hair, which is worth noting, but may be conventional. The absence of beard indicates the custom of shaving. On the conventionality of the Egyptian artists see the same writer in the *Papers of the Oriental Club of Philadelphia*, p. 78 (Boston, 1891). The ruins of the ancient Pteria are supposed to offer the purest examples of native Hittite work.

‡ "L'influence qui a presidé aux arts chez ce peuple est purement chaldeo-babylonienne, et non assyrienne; mais en meme temps elle conserve son originalité." De Morgan, *Mission Scientifique au Caucase*, p. 198.

ited portions of the country there still live a shy, secluded people, the Taktadschy, who preserve just these traits, and he at once noticed their similarity to the Auvergnats and Savoyards. They are recognized as the descendants of the most ancient inhabitants, and certainly present their characteristics.*

The inscriptions and local dialects of Cappadocia and Lycia preserve some expressions which appear to me to be of the Lesghian group of the Caucasic stock; as

	CAPPADOCIAN.	LESGHIAN.
woman,	*lada*,	*thladi*, wife.
son,	*tideime*,	*gedai-mi*, son (thy).
six,	*lingir*,	*oinththligu*.
seven,	*tŭtli*,	*othlgu*.
eight,	*mŭtli*,	*mithlgu*.
nine,	*dangar*,	*udczgo*.

These indicate that at some time in the past there has been an impermeation of Caucasic elements into the Cappadocian population.† The Taktadschy have adopted the modern Turkish, at least for intercourse with the world.

The Anatolian inscriptions proper seem as likely to be in Aryan as in any other stock. The personal pronouns *mi* and *ti* are surely Aryan, and not "Alarodian," as Hommel argues;‡ they are the English-Aryan *me* and *thee*; the word for son, *s-t-r*, corresponds to the Armenian *ustr*; "siris," king, is Aryan, and so on §

The strongest evidence is in the ancient place-names. These show peculiarities in western and southern Asia Minor which have been repeatedly commented upon. A large number of them terminate in *-anda* (*-enda*, *-inda*, *-onda*) or in *-ess* (*-assa*, *-essos*, etc.). They extend westward into Thrace and Macedonia, proving a European connection in prehistoric times. Pauli, Toma-

* See Von Luschan's article, "Die Taktadschy," in the *Archiv für Anthropologie*, 1893.

† Tomaschek quotes some of these from the Glossary of the Cappadocian dialect lately published by Capolides, which work I have been unable to see. Tomaschek does not offer any analogies for them. Others belong to the "Lycian inscriptions," of which a Corpus is soon to be published by the Imperial Academy of Vienna.

‡ In the *Archiv für Anthropologie*, Bd. xix, p. 251.

§ See the article of Dr. Jensen above referred to for other instances; and also his replies to the criticism of Prof. Sayce in the *Academy*, 1894. Of course, within the territory of the Anatolians we may expect to find both Semitic and Caucasic names and inscriptions, as it was the meeting-ground of the three stocks for thousands of years before history began, as it has been ever since.

schek and others claim that they cannot be analyzed as of Aryan extraction.*

Such an opinion seems to me without foundation. We find such place-names wherever the Celtic stock of central Europe left its traces. For the termination in *-ess*, I need but instance Vindonissa, Vogessus, Sigonessus, Bodiocassus, etc. Its signification is well known. It means "the seat" (*sedes*, *sessio*, *positio*) of the person or tribe, and in this sense was especially employed as a suffix in the Celtic dialects.†

The termination *-anda* in the form *-anta* or *-ante* is a familiar Celtic suffix of tribal names, as Brigantes, Trinobantes, etc. From these were derived place-names, as Carantia, Brodentia, etc. The later terminations in *-anza* or *-enza*, as in Braganza, Piacenza, etc., were corruptions of this, as was also the German termination in words like "Pegnitz," etc.‡

Many other proper names of places and persons from southern Asia Minor have lately been analyzed by M. Georges Radet, and his researches appear to place beyond doubt these two theses—1. That the original Anatolians constituted an ethnic unit; 2. That they spoke a tongue of Aryan affiliation.§

Many of these names have a Celtic physiognomy. Thus the Hittite royal names, Thargathazas, Tarthisebu, etc., simulate the Gallic Thartontis, Turones, etc., in which the prefix *tar* (*thar*, *tur* or *dor*) means "above, across," and by metaphor, superior, leading, etc.‖

A more striking coincidence is offered by some religious terms.

It is generally conceded that the Ephesian Diana was originally a "Hittite" deity, and that her name Artemis is an Anatolian word. It is also known that the original form under which she was worshiped was that of a black conical stone, thought to have been a meteorite. Now in Celtic *artan* means "a stone," and it often forms a part of proper names, as Artgal,

* Pauli has been industrious in collecting such place-names. A long list will be found in his *Inschrift von Lemnos*, above quoted.

† This is the explanation of Zeuss, *Grammatica Celtica*, pp. 61 and 747–749. I am surprised that it has been overlooked.

‡ See Zeuss, *Grammatica Celtica*, pp. 759, 760. It has been suggested that this termination is the Old Indian *inda*, *sindhu*, river, whence Indus, etc., applied to tribes, towns, etc., on a river.

§ See the *Revue Archéologique*, Tome xxii (1893), p. 209, *sqq.*

‖ The Celtic *tar essi* (see above) is translated "super locum, in loco." Zeuss, *u. s.*, p. 613.

Artbran, Artobriga, etc. Still more: when St. Domitian undertook the conversion of the Celtic Segusiani, who lived in the Auvergne mountains in France, he found what appears to have been a sacred rock among them which was called *Artemia!* *

I have already referred to the Amazons as a Hittite class of priestesses. Lieut. von Kannenberg derives their name from the Circassian *maza*, moon; but this Circassian word is not from a Caucasic, but an Aryan root, Sanscrit *masa*, "the measurer," and was applied to the moon as the measurer of time, as Von Erckert has abundantly shown.† The Amazons were indeed the priestesses of the moon, but their name is Aryan strictly and refers to their being devoted *ad masam*, to the moon, as the measurer of the nine months of pregnancy.

This identification explains how it happened that in the year 279 B.C. a horde of Gauls from central Europe crossed the Hellespont, and proceeding to central Asia Minor, settled in a portion of the ancient *mat Hatte*, from them ever since known as "Galatia."‡ There they lived, retaining their own tongue with the usual Celtic tenacity so completely that St. Jerome, seven hundred years afterwards, says they were the only people of his day in the whole of Asia Minor who did not speak Greek.§

To sum up, then, the view I advocate is, that the Anatolians proper were of the Celtic stem of the Aryan race; that several thousand years B.C. they came from the west and occupied the valley of the Halys and more or less land to the east and south of it, driving out, or subjecting and retaining, an earlier population of the Caucasic (Lesghian) stock; that about 1200 B.C. they were themselves overwhelmed by Semitic and Hellenic adversaries; that a portion of them rejoined the Celts of Europe; and that it was to make good some traditional, ancestral claim that the descendants of these in 279 B.C. again possessed themselves of the basin of the Halys.‖

* "Usque ad petram quæ Artemia dicitur." Zeuss, *Grammatica Celtica*, p. 78.

† *Die Sprachen des Kaukasischen Stammes*, Bd. I, s. 103.

‡ "Galatæ" is from the Celtic root *gal*, violent, and is translated by Zeuss "viri pugnaces armati." *Gram. Celt.*, p. 993, note. The authorities on this invasion are well collated in Schliemann's *Ilios*.

§ This also explains the difficulty commented on by Dr. John Beddoe (*The Races of Britain*, p. 22) that various local names in Galatia and its neighborhood anterior to the arrival of the Galatians appear to be from Celtic roots. Niebuhr's theory that the Galatians were Teutons has now, I think, no defenders.

‖ The assertion of Schliemann (in *Ilios*, p. 120), that "No Aryans were settled east of the Halys before the eighth century B.C.," is possibly true if confined to Aryans of Hellenic descent, but certainly not as a general statement.

Conclusions.

My general conclusions are:

1. That there is no evidence of a prehistoric, non-Eurafrican race in western Asia. Its soil has always been possessed either by the Caucasic, the Semitic or the Aryan branches of the White race.

2. There are distinct signs that the Caucasic stock in prehistoric times extended over large areas south of their present homes, and were driven north by the attacks of the Aryans and Semites.

3. The chains of the Amanus on the west, the Masius on the north and the Zagros on the east have been from immemorial eras the limits of durable ethnic impressions by the Semites.

4. From the Zagros to the Pamir, the Aryan stock occupied or controlled the land at the dawn of history. Medes and Proto-Medes were alike Aryans.

5. The civilization of Babylonia arose from some branch or blend of the White race, and not from any tribe of the Asian or Yellow race, still less from the Dravidian or Black races.

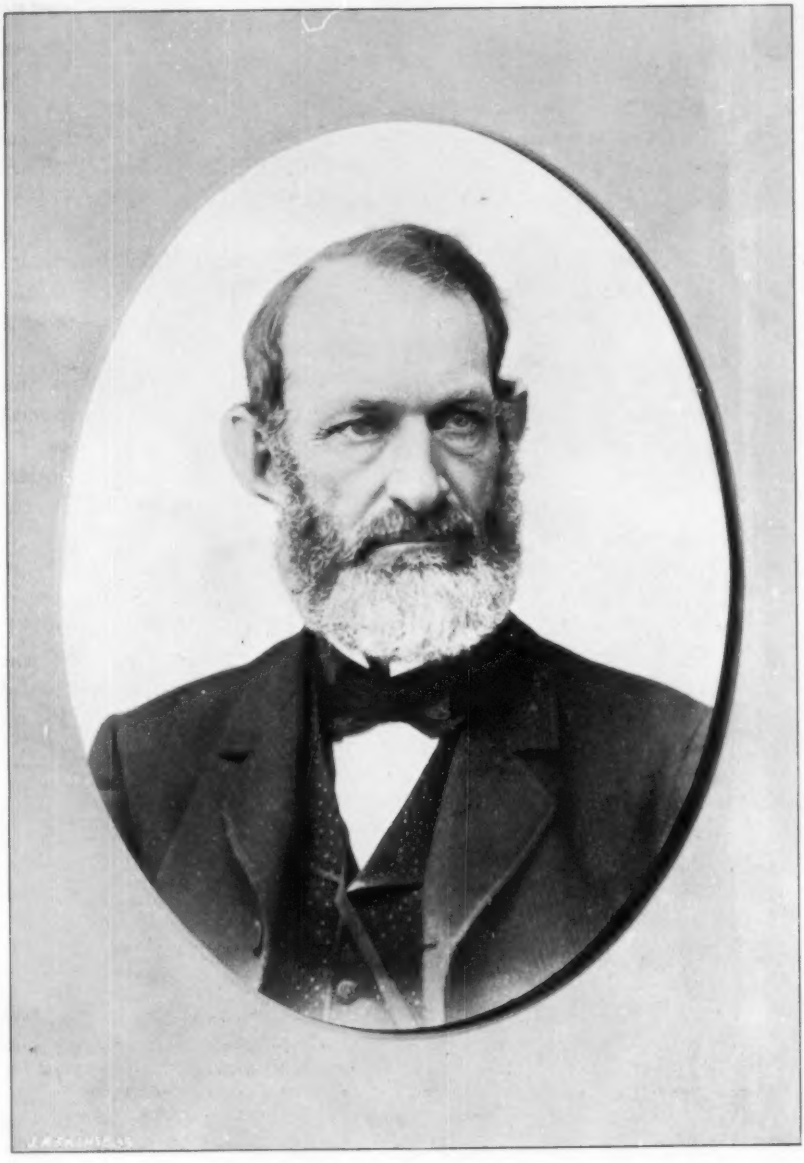
6. The Anatolian group of Asia Minor were allied to the Gallo-Celtic tribes of central Europe, and preceded by probably several millenniums the Hellenic migrations into Asia.

Biographical Sketch of the Hon. Thomas H. Dudley, of Camden, N. J., who Died April 15, 1893.

By William John Potts.

(*Read before the American Philosophical Society, April 19, 1895.*)

Thomas Haines Dudley, born 10th mo. 9, 1819, died 4th mo. 15, 1893, elected a member of the American Philosophical Society 10th mo. 15, 1880, was descended from Francis Dudley and Rachel Wilkins, his wife, a member of the Society of Friends who came from the Parish of St. Peter, Wolverhampton, Staffordshire, about 1730. Francis Dudley was the son of John Dudley and Mary Arney, of that parish; who were married in 1708. Another account says the name of his mother was Jane Dudley. John, the English ancestor of this New Jersey family of Dudley, died in 1746. In the parish register of St. Peter's he is named as "singing man and clerk."



Thomas W. Dudley

Francis Dudley, the eldest son, so tradition says, came over with Nathan Middleton, and shortly after married Rachel Wilkins in 1733, settled at Evesham (the "Vale of Evesham," as the early settlers called it in memory of their old home in England), Burlington county, N. J. This progenitor of the name in this State died in the early part of 1782 at Evesham. We find his will on record in the Secretary of State's office at Trenton, and that of his widow Rachel a few years later, in 1786. He leaves his three sons goodly farms, upon the metes and bounds of which he dwells minutely with all the pride of a Saxon landholder. In this connection we are reminded of the eloquent words of Mr. Blaine in his oration on President Garfield, which are equally applicable to Mr. Dudley. Mr. Blaine says he "was born heir to land, to the title of freeholder, which has been the patent and passport of self-respect with the Anglo-Saxon race ever since Hengist and Horsa landed on the shores of England."

Thomas Dudley, son of Francis, married Martha Evans, 11th mo. 27, 1762, of an old and respectable family among Friends. They had ten children. Evan Dudley was the ninth child; he was born 1st mo. 1, 1782, married Ann Haines and died 3rd mo. 21, 1820, aged thirty-seven years.*

Thomas Haines Dudley, the subject of this biography, was the youngest child of this marriage. His early youth was passed in Burlington county, where he was born, working upon his mother's farm. She was early left a widow with four children. She was a descendant of Richard Haines, of Aynhoe, Northamptonshire, whose children came to Burlington county, N. J., in 1683; thus we see Mr. Dudley had a claim to early American ancestry on both sides of his family. For some years he taught school in the vicinity and saved sufficient money to begin the study of law under William N. Jeffers, a lawyer of good standing in Camden. During this period, while he was returning from a night school late in the evening, an incident happened which we have often heard him relate without any thought of our application of it to himself. It showed the same determination and courage which was the ruling trait of his life and the cause of his success. Passing at twelve o'clock at night over a lonely road by a graveyard, he saw in the grounds what seemed to him, the more he gazed upon it, to be the figure of a human being in white, moving and bending toward him. Though so frightened that his teeth chattered and his knees fairly knocked together, he determined to go forward and examine it. Climbing the fence, he was strongly tempted to go back; he shook with fright, the thing seemed so supernatural in the moonlight, but reasoning strongly within himself, "there is no such thing as a ghost," he determined to push on, and conquering all his fears, pressed forward and found that the weird figure was a sheep with its horns caught in the bushes, moving up and down in its efforts to get free.

* We are indebted to Miss Henrietta Haines, of Moorestown, N. J., and to Miss Martha Evans Bellangee, of Asbury Park, N. J., for valuable genealogical data, and regret that limited space does not permit us to give other details.

Between fifty and sixty years ago there was more belief in ghosts than now, and when we consider Mr. Dudley was then a young man, brought up in an atmosphere in which this belief was not uncommon, the circumstance was one that few—alone at such an hour in the middle of the night, in a lonely country graveyard—very few, indeed, would have stopped to investigate. His description was much more graphic and awe-inspiring than we can give, and was related to the writer as an instance that we must not be influenced by groundless fears in what reason tells us is untrue.

Among Mr. Dudley's papers is a draft of a short article by him, signed "Many Citizens," probably one of his first political efforts. It was published in the *United States Gazette* during the year 1843. This concerns the removal of Judge Philip J. Gray from the office of Surveyor of the Port of Camden. He was a man of character, highly respected, and was afterwards reinstated by Zachary Taylor. President John Tyler is taken to task for this removal as being inconsistent with the views expressed in his inaugural address to the people of the United States, April 9, 1841, where he says, "I will remove no incumbent from office who has faithfully and honestly acquitted himself of the duties of his office, except in such cases where such officer has been guilty of an active partisanship, or by secret means, the less manly and therefore the more objectionable, has given his official influence to the purposes of party, thereby bringing the patronage of the Government in conflict with the freedom of elections."

In 1843 Mr. Dudley held the two offices of City Clerk and City Treasurer of Camden when aged twenty-three.

When twenty-four years of age we find him taking an active part in the Clay campaign as Secretary of the Clay Club of Camden; August 29, 1844, drawing up the minutes of the District Clay Club Convention, held at Bridgeton at that date, as its Secretary; Dr. Ephraim Buck, President, associated with men some of whom were to become famous in the State, namely, Abraham Browning, A. G. Cattell, Dr. E. Q. Keasbey, Charles P. Elmer and others.

Among his papers is a rough drawing of a "Clay Cabin," a curiosity to the present generation. It was located at Fourth and Market streets, Camden, and these few details are worthy of being recorded for the history of politics in this vicinity in what was a very exciting campaign. This "cabin" of those primitive political days of half a century ago was "46 feet deep and 25 feet front," with, of course, a flagpole, made in the early part of the year 1844 for the Camden Clay Club. The building came to a little more than the contract, costing in all $155 "32 benches at 50 cts. pr. peas," the carpenter's bill calls for, which gives an idea of Clay's political following in the neighborhood. Allowing five persons to a bench, we may conclude "the cabin" held 160 persons. Mr. Dudley seems to have been active in all of this organization. A good speech of his, made on the occasion of a flag presentation to this organization, has been preserved. It will be remembered he was then but twenty-four,

and at that youthful age he takes strong ground for the protection of American industry. His first child, who died in infancy, was named for Henry Clay. This was the early school of one who was afterward to have a much more enlarged sphere.

With his hard-earned savings and the money he had obtained by mortgaging his farm to study law, he at last passed his examination in 1845, and having been admitted, retired to his room at his boarding house in Camden, shut the door, threw himself on the bed greatly depressed, wondering where his bread was to come from without a single client, when there came a knock on the door and a client appeared in the person of Mr. Benjamin Cooper, of Camden county, engaging him for a case of which there were perhaps few men able or willing to undertake, from its difficulty and danger, in which all the instincts of humanity required a speedy action. A free colored family of Burlington county, personally known to Mr. Dudley, had been kidnapped into slavery, a mother and three children, and had been rapidly driven away on the road South. Members of the Society of Friends of Burlington county hastily met together and subscribed, it is said, a thousand dollars to buy back the woman and her children. The difficulty then arose, who was to pursue the fleeing kidnappers and their victims and redeem the captives, a most dangerous task in those days for a Northerner to venture across the border on such an errand of mercy and of justice.

Mr. Cooper informed his coadjutors that he knew such a man, who had just passed the bar, whose sympathies were with the Abolitionists, and, above all, possessed the energy and determination necessary; who knew, besides, the captives, as the woman had often worked on his mother's farm when he was a child. Disguising himself in the character of a slave trader, who were often Northern men from the borders, Mr. Dudley procured a large broad-brimmed hat, a whip, and taking a pair of pistols he followed the track of the fugitives and was so fortunate as to discover them near the Head of Elk, in Maryland. He gave out that he was from a distant part of the country buying slaves to take South. The sale was not accomplished without its dangers, for presuming he must have a large sum of money with him, he overheard a plot to rob him, and sat up all night in the hotel with his pistols before him on the table. Keeping up the character of a slave trader, he had behaved so roughly to the woman and her child that they did not recognize him and took him for what he pretended to be. He ordered them to be locked up safely until he could take them away in the morning. The poor woman, overcome with fear, reluctantly followed. Making a detour south to deceive the kidnappers, it was not until on the boat at Wilmington, Del., that he asked the poor creature if she did not know him, and received for a reply, "All she wanted to." Her fears turned to joy when he said, "Don't you remember Nancy Dudley's little boy, Tom, who used to play pranks on the cows you milked at Evesham and make them kick the pail over?" And when he told her she was going home, her happiness can be imagined.

We give below a copy of the deed of sale,* with a feeling of earnest thankfulness that a bill for a slave is no longer a possibility in this country. Of the other children, a boy and a girl, it is said the boy was advertised for sale in Baltimore, and was bought by Mr. Dudley for ninety dollars, before the sale came off. The girl was purchased by a lady in Baltimore.

The West Jersey Mail, a weekly paper of Camden, records his marriage in its issue of Wednesday, March 11, 1846, as follows: "In this city, on fourth day evening last, 4 inst. by Friends' ceremony, Thomas H. Dudley to Emmaline, daughter of Seth Matlack."

She was a faithful and devoted wife, the mother of three children, who survived infancy—Edward, Mary, and Ellen. Mrs. Dudley died at Madrid, Spain, February 9, 1884, regretted by all who knew her as a woman of a happy disposition and kindness of heart, with many qualities serviceable to her husband in his career.

In July, 1848, he was admitted a counselor-at-law. While practicing law and engaging in politics his acquaintance began with such men as the late Henry C. Carey, David Davis (afterwards Judge of the Supreme Court of the United States), Judge Ephraim Marsh, and others active in political life, which acquaintance ripened into friendship and lasted to the end of their lives.

In the beginning of the decade of 1830 we find among his correspondence, numerous letters in the minute hand of the eminent writer on the tariff, Mr. Carey, above mentioned, largely upon this subject, of whom he was an apt pupil.

In 1851 he was elected City Treasurer of Camden, and in the years 1856 and 1857, City Solicitor; in 1856, Chairman of the Republican State Executive Committee of New Jersey.

Mr. Dudley was one of the number of those saved in the burning of the ferryboat *New Jersey* on Saturday evening, March 15, 1856. This calamity was one of the most terrible which had ever occurred in this vicinity. It was brought prominently before the inhabitants of the two cities, Camden and Philadelphia, by the drifting of the steamboat in flames, in full view of thousands of spectators from both sides of the river, who could see the unfortunate passengers when near Philadelphia

* Know All Men by These Presents that I, William E. Chance of the county of Caroline, State of Maryland, for the consideration of one hundred and fifty dollars current money, to me in hand paid by Thomas H. Dudley of the State of New Jersey, the receipt whereof I hereby acknowledge, have granted, bargained, sold, aliened, and delivered, and by these presents do grant, bargain, sell, and deliver unto the said Thomas H. Dudley my negro slave Maria Johnson and her child Susan about 16 months old, which said slaves Maria and Susan I will warrant and defend to the said Thomas H. Dudley, his executors and administrators and assigns against me, my executors and administrators and against every other person or persons whatsoever. In Witness Whereof I have hereunto set my name and affirmed my seal this eighteenth day of October in the year of our Lord one thousand eight hundred and forty-five.

In the presence of I. M. Bernard. } Signed, William E. Chance. (Seal)

leap one by one into the water, driven over by the fire, and could distinctly hear their cries. The solemn sound of the State House bell, the ringing of the firebells in both cities, and the lurid glare which lighted up the Delaware, added to the horrible scene, of which the writer was one of the eye-witnesses from the Camden shore. The pilot box was the first part of the vessel to catch, and consequently the boat soon became unmanageable. Loaded with heavy wagons and a hundred passengers returning to their homes in Camden, nearly fifty persons, it is said, were lost. Finally driven by the flames, Mr. Dudley, throwing away his overcoat to sink more easily and avoid the paddle-wheels which struck many, sprang as far as possible from the side of the vessel, and came up in a mass of crushed ice, which gave but a partial support. It was in this situation that he saw many leap into the water, their clothes on fire and their cries most agonizing—a scene which naturally had an effect upon his nervous system, and one never to be forgotten, of which he rarely ever spoke. Shouting until his cries grew faint, he was despairing and overcome with cold, when several men in a boat which put out from the Philadelphia side, rescued him, and he was carried in a state of apparent death to the hotel at Arch street wharf, where all efforts to bring him to life seemed in vain. Mr. Albert S. Markley, of Camden, a well-known director in the Camden & Amboy Railroad, happening in, recognized him, and after long and persistent efforts, though told it was no use, the man was dead, restored him to consciousness. Mr. Dudley was then in his thirty-sixth year.

In 1860 he was Chairman of the State Executive Committee of New Jersey.

"In 1860 he was chosen as one of the Senatorial delegates from the State at large, in the memorable convention at Chicago, which nominated Abraham Lincoln for President. He was a member of the committee which framed the platform adopted by that convention, and it was he who introduced the plank favoring incidental protection to American manufactures and was mainly instrumental in carrying it through the convention. He supported Mr. Lincoln as a candidate for nomination, in opposition to Mr. Seward, and took a prominent part in bringing about that nomination.

"The manner in which this nomination was effected, and Mr. Dudley's part therein, is thus related by Charles P. Smith in *Beecher's* (Trenton) *Magazine*. As these are facts of historic interest, we give the account in full." [We shall introduce Mr. Smith's account by a few words from Mr. Isaac H. Bromley's striking and vivid paper, with the same title, in *Scribner's Magazine* for November, 1893, a spectator as a journalist in the scenes which he describes. He was afterward one of the editors of the New York *Tribune*. Mr. Bromley says, "The Chicago Convention of 1860 was much more than an organized body of delegates, its work much more than that of nominating candidates. Its transactions overshadowed in importance, outreached in consequences, and transcended in results those of any assembly of men that was ever gathered on this con-

tinent. I shall not stop to answer the reader's rising thought of Philadelphia and 1776." This is strong language, but Mr. Bromley impresses the reader with its truth. Both narratives, though widely different in their style, deserve a place in the history of this important occasion.]

"THE NOMINATION OF LINCOLN.

"As a member of the 'Opposition State Executive Committee' I signed a call for a State Convention in Trenton, on March 8, 1860, for the purpose of selecting delegates to the National Convention at Chicago. At that period there was a respectable and extremely active portion of the party in East Jersey in favor of nominating Mr. Seward for the Presidency and seeking to secure for him the vote of this State in convention. Aside from the Presidential question, it was highly important that we achieve success in our own State, and this, I felt confident, could not be accomplished with Mr. Seward as our Presidential candidate. It occurred to me that our proper course would be to hold the vote of the State on Mr. Dayton, and possibly give him the nomination. At all events, it might at least aid in nominating a candidate with whom success in this State was possible. Mr. Thomas H. Dudley came into the Supreme Court office one day on professional business, and I called his attention to what I deemed the unfortunate tendency of affairs. He coincided with me in opinion, but argued that the loss of the State under the circumstances was unavoidable —at least he perceived no recourse. I suggested that we start a candidate in our own State, to hold the vote, and named the Hon. William L. Dayton. Mr. Dudley, after some consideration, assented. I then advised holding a caucus of leading men of the party to give force to the movement, whereupon Mr. Dudley agreed to notify such gentlemen in the First Congressional District as he might deem proper and I was to summon from the State at large. We thus assembled some sixty prominent Jerseymen at Jones' Hotel, Chestnut street, Philadelphia. I also spent considerable time in securing the attendance of a number of active Philadelphia Republican politicians. My object was to induce them to join in the movement; but they preferred Mr. Cameron. As far as their coöperation was concerned, the movement was without success. Abraham Browning, Esq., of Camden, presided at the meeting, and after considerable discussion, in which Mr. Dudley took by far the most prominent part, the Jerseymen present unanimously determined to use their best efforts to secure delegates in favor of Mr. Dayton. The effect of this meeting was fully manifested in the State Convention. But a small moiety of the East Jersey delegates were for Mr. Seward, while the large majority were decidedly for Mr. Dayton. Mr. Dudley was selected as a delegate from the First District, and at Chicago was one of the most prominent and active members of the New Jersey delegation, exercising all necessary influence in holding the vote of his State for Mr. Dayton until he was able to cast it for Mr. Lincoln, and practically give him the nomination.

"It was conceded early in the session of the convention that there were four doubtful States—New Jersey, Indiana, Illinois and Pennsylvania—and it was necessary to carry at least two of these States in order to nominate a candidate other than Mr. Seward. New Jersey presented Mr. Dayton; Pennsylvania, Mr. Cameron; and Indiana and Illinois, Mr. Lincoln. Mr. Seward was the first choice of a majority of the New England States, but the event disclosed that they preferred the triumph of principle to the success of their favorite. A committee of these States, headed by Ex-Governor Andrew, waited upon the New Jersey delegation at their rooms, and declared that Mr. Seward was their choice, but if he could not carry the doubtful States they were willing to go for any one else who could, but added, 'Gentlemen, you see our difficulty; you are not agreed among yourselves, but present three different candidates. Now, if you will unite upon some one man who can carry them, then we will give him enough votes in the convention to nominate him. If you continue divided we shall go into the convention and vote for Mr. Seward, our first choice.' It was narrowed down to this; the four doubtful States must unite upon a candidate or Mr. Seward would be nominated. The convention assembled Wednesday morning, without change in this state of affairs. Mr. Dudley was assigned a place on the committee to frame a platform, and kept busy until Thursday noon. At that time the four doubtful States assembled at Cameron Hall to endeavor to unite upon some person. Ex-Governor Reeder presided. It was a noisy assemblage, and it very soon became evident that nothing could be accomplished as affairs then stood. Mr. Dudley then proposed to Mr. Judd, of Illinois, that the matter should be referred to a committee of three from each of the four States. He made a motion to this effect which was carried. Among those appointed were Judge David Davis, Caleb B. Smith, David Wilmot and William B. Mann, of Pennsylvania. On the part of New Jersey, Judge Ephraim Marsh, Hon. F. T. Frelinghuysen and Mr. Dudley. The committee met at six P.M. in Mr. Wilmot's room and were in session until nearly ten P.M. before anything was accomplished. At that time it seemed that an adjournment would be carried without arriving at an understanding. The time had been consumed in talking and trying to persuade each other that their favorite candidates were the most available and best qualified. It was then that Mr. Greeley went to the door, and finding no agreement had been reached, telegraphed to the *Tribune* that Mr. Seward would certainly be nominated the next morning as the Republican candidate.

"Finding that the committee was about to separate without achieving any result, Mr. Dudley took the floor, and proposed that it should be ascertained which one of the three candidates had the greatest actual strength before the convention, and could carry the greatest number of delegates from the four States in the event of dropping the other two. Judge Davis stated as to Mr. Lincoln's vote on the first ballot, and the probable vote of the Illinois delegates, in the event of Mr. Lincoln being

dropped—that is, how they would break. The committee from Indiana and Pennsylvania also reported how the votes of their States would be cast if Lincoln and Cameron were both dropped. The New Jersey committee made a similar statement as to the strength of Judge Dayton. It was understood that a portion of the New Jersey delegates would drop Mr. Dayton, after giving him a complimentary vote, and go for Mr. Seward.

"This examination revealed the fact that of the three candidates Mr. Lincoln was the strongest. Mr. Dudley then proposed to the Pennsylvania committee that for the general good and success of the party they should give up their candidates and unite upon Lincoln. After some discussion, Mr. Dudley's proposition was agreed to, and a programme arranged to carry it into execution. A meeting of the Dayton delegates from New Jersey was immediately called at James T. Sherman's room, at one o'clock that night; Judge Marsh and Mr. Frelinghuysen, evidently not believing it possible to carry out the plan, did not attend the meeting; thus Mr. Dudley was the only one from the committee present. He explained what had been accomplished, and, after talking the matter over, they approved his action. It was understood that Judge Dayton was to receive one or more complimentary votes, and then the strength of the delegation to be thrown for Mr. Lincoln. It was also arranged that Mr. Dudley was to lead off in voting for Mr. Lincoln, and then they were to follow. The Pennsylvania delegation likewise adopted the plan, first giving Mr. Cameron a complimentary vote. The agreement of the committee was not generally known when the convention assembled. On the first ballot the entire New Jersey delegation voted for Mr. Dayton; the next, that portion who favored Mr. Seward, voted for him, while the majority voted for Mr. Dayton. When New Jersey was called on the third ballot, Mr. Dudley stated that he should vote for Mr. Lincoln and was immediately followed by all the New Jersey delegates save one. The result is known. New England did what she promised, and Mr. Lincoln was nominated. It was the action of the committee from the four doubtful States which undoubtedly secured Mr. Lincoln's nomination; but for this Mr. Seward would have been nominated, and there is little doubt, just as surely defeated. This is a plain narrative of the manner in which the nomination of Abraham Lincoln was brought about. It cannot be disguised that, had it not been for Mr. Dudley's energy and tact in the committee of the doubtful States, the nation in the emergency which so soon followed would not have had the service of that great and good man at the helm.

"Mr. Lincoln recognized his obligations to Mr. Dayton's friends by nominating that honored citizen to the important position of Minister to France. I wrote to Mr. Lincoln after his inauguration; stating fully Mr. Dudley's action in the convention, and asking his appointment as Consul to Liverpool. Others likewise urged his claims, and he was appointed to the position, where his eminent services during the Rebellion were

scarcely inferior to those rendered by our Minister at the Court of St. James."

Early in 1861, before he had accepted the position of Consul to Liverpool, Mr. Dudley went abroad for his health. While there, he was appointed Consul to Paris, to fill the temporary vacancy, Mr. Bigelow not having yet arrived and the former incumbent having proved a Secessionist.

The trying situation of Mr. Dudley and the little band of American patriots in Liverpool is best described by Mr. William Everett in his address on Charles Francis Adams.* He says: "I was in England during the first two years of the war. I was one of that little company of Americans whose duty kept us in England, scattered, isolated, scantily informed, learning what was going on at home chiefly from garbled telegrams, not knowing what to believe, yet called to account for everything rash or foolish done or said to be done in North and South alike; sneered at, taunted, patronized and forced every hour to fight the battle of our country's honor as truly as you who were in the regiments at home. You had your trials; believe me, we had ours. You were five hundred thousand strong; we were scarcely a fair-sized regiment, and scattered farther apart than the pickets of a whole army corps. You had the nation at your very backs; we were cut off from it by ten days of ocean. You had those who took eager account of your triumphs and your disasters. We might bear tortures as acute as wounds or fever, and deal what blows we could, with none to note or sympathize. Yet there we fought, resolved that the name of America should not die in the land from which her founders came. And to him we looked as leader, as commander in our strife for honor; and none who fought under McClellan or Grant, under Dupont or Farragut, remember those heroes with more grateful devotion than that which we pay to the memory of Charles Francis Adams."

It is impossible to read Mr. Adams' letters in "The Diplomatic Correspondence" without having a profound respect for the character of the man and his diplomatic ability. Mr. Dudley's relations with Mr. Adams were constant and close. Surrounded by spies, a written correspondence was not always deemed safe, as every moment the Consul at Liverpool was watched and followed. For these reasons he often took the train for London from Edgehill, having previously arranged to have his family take his valise in their carriage and meet him there. He had noticed that if he carried a handbag a spy was sure to follow and take the same train, surmising his destination. If without it, apparently he was free from this espionage. The numerous letters from his friend, Mr. Benjamin Moran, the Secretary of Legation at London, were purposely written in such a vague way that if they were intercepted, they would be of no ser-

*William Everett's "Address on Charles Francis Adams," July 4, 1887, Cambridge, 1887, pp. 85, 86, 87.

vice to the rebel agents. Having examined a large number of them, we must give Mr. Moran credit for great ingenuity.

Liverpool, which owed its early rise and progress to the slave trade, was in a great variety of ways the stronghold of Southern sympathy. An instance is given in a letter of Mr. Seward to Charles Francis Adams in "The Diplomatic Correspondence."

"MAY 1, 1862.

"*Sir*:—Mr. Dudley our vigilant consul at Liverpool, writes that the subscription which was gotten up in that place to aid the insurrection in this country mounted up to £40,000 sterling, and that all that large sum of money has been invested in arms and munitions of war. He also states that a second subscription for the same purpose is now being filled up in the same place.

"I can hardly doubt that he has brought these facts to your notice and that you have called the attention of her Majesty's government to them."

The Consul received numerous threatening letters warning him unless he ceased his opposition to those who gave substantial assistance to the Confederate government, his life would be taken, and if found in certain designated spots he would be shot on sight. These threats had little effect on his determination to do his duty. It is pleasant to meet with an occasional friend of the Union, whose sympathy an American at such a crisis needed at this advanced outpost in what may truly be called the enemy's country. John Bright was such a one, whose letters of heartfelt sympathy we print below.* On one occasion we meet with the letter of an undecided friend from an anonymous source, who seems ashamed of

* The English friends of the Union in Liverpool were few, but hearty and practical in their sympathy. They deserve to be held in grateful remembrance. First we would mention the Vice-Consul of the United States, Mr. Henry Wilding, an able and efficient officer, himself an Englishman. He died a few years since. Charles Edward Rawlins, Ex-President of the Chamber of Commerce; Robert Trimble; James Spence, elsewhere mentioned in this article; Charles Wilson; William Inman, of the Inman Line Steamship Company; William Crossfield; Samuel Bulley; Thomas Avison, and the firm of Jevons & Ryley (Wm. A. Jevons, Thomas C. Ryley).

The American merchants who formed the Liverpool colony that were steadfast in their devotion to their country were Daniel James (of Phelps, Dodge & Co.), George Warren (founder of the Warren Steamship Company), Stephen B. Guion (head of the Guion Line), B. F. Babcock, William T. Whittimore and Henry Nash.

The Americans were in some sense in a state of siege, surrounded by their enemies. These earnest men brought private news of the success of the Union arms to the Consul and distributed correct information among the friends of the United States, sometimes in the middle of the night; otherwise all they would have known for at least two weeks were garbled telegrams and false reports. Among the English, the family of Mr. Robert Trimble, above mentioned, made with their own hands and the help of their friends eight hundred garments for the freedmen of the South. The determination of these few men, headed by Mr. Dudley, and the colony in London led by Mr. Adams was not without its influence being ultimately felt in England. John Bright's remarkable speeches were followed by the sympathy of some of the most profound thinkers in Great Britain.

the disgraceful piratical proceedings of his fellow-Englishmen, and sends the Consul the following picturesquely descriptive note :

"*Sir* :—There is a steamer called the *Kirang Tung* in the Birkenhead Dock sails built and Guns on board, said to be for the *Chinese* and ready to sail any tide ; she came from the same building yard as the *Alabama* and it may be worth your while to look after her. She has two masts, wholly or partially brig-rigged, two funnels painted light colour, black hull and light blue paddle boxes, built of iron with a ram bow . . . . I don't side particularly with North or South but

"I am

"No Privateer's man.

"Liverpool, 1 May, 1863."

A few of Mr. Bright's letters are marked "private," but this the reader will readily see bears on the time and circumstance, which secrecy above thirty years' distance removes. They all do him the highest honor, and show that his political course and some of his important speeches, which considerably influenced the English people of the liberal sort, were probably to some extent owing to Mr. Dudley's efforts to keep him correctly informed.

"Rochdale, Dec. 29, 1861.

"*Dear Sir* :—I am very much obliged to you for your kind letter, and I shall be very happy if anything I have said shall contribute to the preservation of peace.

"There are two nations in England—the governing class and the millions who toil—the former dislike your republic, and their organs incessantly misrepresent and slander it—the latter have no ill feeling towards you, but are not altogether unaffected by the statements made to your prejudice. I hope however that out of present perils we may see a bright future and a better understanding between your people and ours.

"Yours very Sincerely,

"John Bright.

"Thos. H. Dudley, Esq., U. S. Consulate,
Liverpool."

"Llandudno, North Wales, Oct. 18, '62.

"*Dear Sir* :—I have ordered the Book of which you speak. I read Gasparin's first Book and thought it admirable.

"I know nothing of Gladstone's speech * except that on the American question it is discreditable to him, and calculated to do mischief. He comes of a family long connected with slavery—and is now the minister in a country where aristocracy rules, and by which a republic is neces-

* Mr. Adams wrote to Mr. Seward from London, October 17, 1862, regarding Mr. Gladstone's speech in much the same manner.

Mr. Adams says later in his letter: "The general opinion now is that he was very indiscreet. But I see no change in the current [of public opinion]. Indeed nothing short of a very decisive victory in Virginia will avail to check it."

sarily hated, and I suppose he takes the color of the atmosphere in which he moves.

"The Proclamation * is a grand move not too soon, nor too late, in my opinion. It must have a good effect here in putting your enemies more and more in the wrong.

"During the winter as your forces get possession of Charleston, Savannah, Mobile and Vicksburgh the negro will learn everywhere who are his friends, and I can see no way of escape for the Conspirators but in working the 'Emancipation' lever for themselves. If they declare for freedom, they may give you a deal of trouble—but if they do not I think their whole basis of industry and power will crumble under them.

"Don't be unhappy about English opinion—there will be a reaction—and it is what you *do* in America, and not what people *think* here that will decide the contest.†

"You offered to write to Horace Greeley asking him to send me the *Tribune*. I shall be glad to pay for it if he has an agent in Liverpool.

"Yours very Sincerely,

"JOHN BRIGHT.

"THOMAS H. DUDLEY, Esq., U. S. Consulate,
Liverpool."

"ROCHDALE, Jany. 26, 1863.

"*Dear Sir*:—Thank you for the Book—I have read it through with much pleasure. I wish it may have a wide circulation in America and in England.

"You may rely upon it that positive sympathy with the South is only to be found in our 'upper crust' and the rich middle class which largely 'flunkey' to it. The People, the millions don't hate America because of the republic—nor do they prefer the disruption of the Union to the abolition of slavery.

"I am sorry your Govt. has not yet succeeded in clearing the great river—they seem generally to underrate the work they have to do—to attempt too many things at once. The retaking of Galveston shows great carelessness on the part of those in authority in the Gulf.

"I hope and believe we shall not hear much of recognition and intervention in the coming session, unless circumstances change for the worse with you.

"The *Alabama* will be discussed in some shape. The Govt. feel themselves in a difficulty about it. I should like to have all the facts of the case, and an hour's talk with you upon them before the meeting of Parlt., but I don't know whether such a thing can be arranged or not.

"Yours very Sincerely,

"JOHN BRIGHT.

"THOS. H. DUDLEY, Esq., U. S. Consulate,
Liverpool."

* The Emancipation Proclamation issued by President Lincoln, September 22, 1862.
† See footnote, p. 113.

"ROCHDALE, Jany. 30, '63.

"*Dear Sir*:—It is possible I may come down to see you to-morrow morning if I can arrange it.

"If I come I shall hope to see you between 10 and 12 o'clock—I must return in the course of the afternoon.

"Yours very Sincerely,

"JOHN BRIGHT.

"THOS. H. DUDLEY, Esq., Liverpool."

"Private.

"ROCHDALE, April 22, '63.

"*My Dear Sir*:—Thank you for the pamphlet. It makes me very angry to read the cases of the *Alabama* and the *Maury*.

"I think Lord Russell will go on with the proceedings against the *Alexandra*. Our Govt. is so much in favor of belligerents that it cannot disregard those international obligations to which it attaches so much importance.

"They find it very difficult for the same reason to say anything against the seizures made by your vessels. The owner of the *Peterhoff** told me that she was not a blockade runner, and had no contraband of war on board. I hope if this be so, your prize court will soon liberate her. It will be a great misfortune if any trouble arises out of any of the recent seizures.

"There is a special hostility to your Commodore or Admiral Wilkes and he should be careful to keep within the law. I cannot be in the House on Friday night. I am kept here at present by domestic affairs and must leave the public to its fate.

"There seems an increasing emigration to the States just now. Can you tell me if an emigrant is, immediately on landing liable to the conscription, or only after a certain time of residence? .Two men have just come back here fearing the draft, and I suppose many are deterred from going by fear of it.

"If your Govt. were to offer a free passage to 50,000 people from Lancashire, I think they might get them—they would be avenged on the cap-

* The case of the *Peterhoff* is related in detail in *Appleton's Annual Cyclopedia* for 1863 under "Prize." She was captured by a United States vessel February 25, 1863, off the Island of St. Thomas. Upon her bills of lading she was bound "for off the Rio Grande, Gulf of Mexico, to Matamoras." Her clearance was from London to Matamoras. She left London early in January, 1863. Her registered owner was an English subject. Her cargo was laden by a large number of shippers, all of them British subjects, with the exception of one, who was a citizen of the United States and a resident of Texas at the breaking out of the war, and was a passenger on the vessel. The portion represented by this passenger was more in value than half the whole.

It was shown by the character, of the army stores on board that they were "contraband of war," that the bills of lading gave a false showing as to the vessel's destination. The ship and entire cargo were therefore confiscated.

italists who have backed the South by making labor scarce and dear hereafter.

"Yours very Sincerely,

"JOHN BRIGHT.

"T. H. DUDLEY, Esq., U. S. Consulate,
Liverpool."

"[P. S.] I wish I could get a copy of your *Homestead Bill*. I do not know what it is."

In an eloquent speech delivered at Birmingham, January 26, 1864, on "The Distribution of Land," recommending emigration to America, Mr. Bright speaks in detail of the Homestead Act, which came into operation 1st January, 1863, and says: "I have a copy of the Act here, and the circular, which was issued from the Department of State, giving direction as to how the Act should be worked throughout the Union" (p. 355, Rogers' Ed. of *Bright's Speeches*, 1868).

"ROCHDALE, April 27, '63.

"*My Dear Sir*:—Thank you for the Homestead Bill, &c. The Documents are very interesting.

"The *Charleston* business is bad as was to be expected. It appears to me that half a dozen people in your Govt. do as they like—trying to do too much and failing almost in all. If the Iron clads had been on the great river, perhaps they might have cleared it by this time—whereas neither one thing nor the other is done—I am afraid Banks is not up to his work at New Orleans—the whole power of the South is evidently in arms, all its force is given up to the war and therefore the contest is doubtful.

"The speeches of Palmerston and the Solicitor General have given offense—naturally enough—I hope the seizure of the *Alexandra* will improve the tone in the States In the debate on Friday last, the Govt. were mild enough, and Mr. Cobden's speech was excellent. It must do much good here.

"I am sorry for your 'heart sickness'—perhaps the clouds will break.

"I am always in trouble for your country—and whilst the contest lasts, I seem able to think of nothing else.

"Yours very Sincerely,

"JOHN BRIGHT.

"THOS. H. DUDLEY, Esq., U. S. Consulate,
Liverpool."

"ROCHDALE, July 9, '63.

"*Dear Sir*:—I am not likely to be in town for some days—but I have sent your note and the extracts to Mr. Cobden and have urged him to see

some of the members of the Govt. with a view to measures to stop the iron-plated ships. I did what I could before I left London. Affairs in the States are very critical. There seems a strange want of foresight and of force at Washington and I fear this has bred *disgust* and *hopelessness* among the People.

"Why pay and fight under Leaders totally incompetent to lead and win? Is not this a possible feeling?

"Again, has the Slavery poison gone so deep as to have polluted and enfeebled the free States that they cannot subdue the revolution which threatens to destroy them?

"History may answer this question—I cannot.

"I have kept my faith till now—and I shall not part with it except as I should part with my life's hope.

"Perhaps another week or two may bring better tidings—I will hope still.

"Yours very Sincerely,

"JOHN BRIGHT.

"THOS. H. DUDLEY, Esq., U. S. Consulate,
Liverpool."

Among the curious miscellaneous correspondence of Mr. Dudley relating to his consulate at Liverpool during the war of the rebellion, were a large number of letters from persons who stated they desired to enlist in the service of the United States. They were sometimes very descriptive of the applicant and often original and amusing, showing considerable egotism and conceit. Many of these were undoubtedly written in good faith, while others were most likely written by spies and those who wished to entrap the American Consul in an offense against the laws of Great Britain. Most appear to have been written by Irishmen whose animosity to England is quite evident, and some were from those who had no real intention of joining the army of the United States, but desired to use this method as a means to obtain a free passage.

We regret that we have not space to give a few of these to show the variety of men the American Consul had to deal with. They have an historic interest as a picture of the times.

Many of these letters being from men then in Lancashire where the operatives were starving through the shutting off of the cotton supply for the mills by the blockade, will bring to mind the passage in one of the above letters of John Bright to Mr. Dudley, April 22, 1863, where he says: "If your Govt. were to offer a free passage to 50,000 people from Lancashire, I think they might get them."

Mr. Dudley was constantly subjected to insults and threatening letters, sneers, and social evidences with the plainest remarks of hatred for him as the representative of the United States. The flag at the consulate was often found with tin kettles and bricks tied to it as an object of contempt. On one occasion it is believed personal violence was intended in an assault

at his own house. Three men apparently bent on mischief rang his door bell, and were so stern in their demands to see Mr. Dudley, that the servant was in an agony of fear, but taking in the situation at a glance the Consul, with prompt presence of mind, quickly shut the door in their faces and bolted it. It is believed they were armed and intended assaulting him. His duties were therefore for the most part entirely new and without precedent, requiring just such a man of more than usual executive ability, promptness, and decision of character, not open to blandishments or bribes.

In the biographical notices which appeared at the time of his death much has been said about his patriotic action in preventing the sailing of the numerous vessels fitted out, not only at Liverpool, but elsewhere, to prey upon American commerce. These general statements give no idea of the character of the work and its arduous as well as dangerous difficulties, in all its intricate details in which Mr. Dudley faithfully served his country. To say that he was a sentinel at the most advanced outpost, and in the midst of the enemy's country; while it gives an idea of his constant watchfulness, barely shows his actual encounter with the enemy. Of the long list of vessels, 324 blockade steamers reported by Mr. Dudley, 126 were either captured, sunk or battered to pieces. The mere mention of their names alone with that of fifty-six sailing vessels engaged in the same piratical enterprise, fill a column and a half in an ordinary sized newspaper. The source from which this is taken gives some valuable details regarding twelve war steamers, which Mr. Dudley also reported and was instrumental either in stopping, or embarrassing so effectually that except in one or two instances, comparatively little harm was accomplished. It was here that Mr. Dudley's legal services were continually employed. He was obliged to be constantly before the English officials with a mass of sworn evidence in regard to the hostile character and destination of these vessels, obtained as best he could in a neighborhood where every obstruction was put in his way, and spies constantly employed to watch his slightest movements, and many who were willing to testify were deterred by the fear of social ostracism and loss of business. Citations to appear were sent to him at the most inconvenient times. He was obliged in self-defense and in the service of his country to fight these persistent people with their own weapons. By the authority of the President he had over one hundred spies employed, and to guard against deception, many of these were spies upon each other, not a single one knew the name or identity of a brother spy. Mr. Dudley himself traveled *incognito* through the country, and for three years there was not a keel laid in Great Britain, without his learning the whole particulars within twenty-four hours.

Impressed with his work, the President gave him extraordinary powers and every consulate in Great Britain, with the exception of the single one in London, was placed under his supervision. Even many of the American Consuls on the continent, who were not under his jurisdiction, repeatedly

wrote to him for advice and instructions, in the new and trying situation they found the rebellion had placed them. The mass of correspondence alone, without mentioning the other work which this situation occasioned, is evidenced by a simple statement of the fact. The following interesting letter to Mr. Dudley from Captain Winslow, of the *Kearsarge*, describing the combat with the *Alabama*, was a fulfillment of the hopes of the little band of patriots resident in Liverpool, as well as of the American people. The engagement took place on June the 19th :

"U.S. KEARSARGE, CHERBOUR, June 24, '64.

"*My Dear Sir* :—Your letter conveying congratulations with many of the same kind has been received. I thank you in behalf of my crew and officers, for this evidence of the estimate you put upon the destruction of the *Alabama*. I think you will ere this reaches you find full particulars in the *Daily News* as Morse and the London Legation have written for them and a *Herald* correspondent has been on board.

"You know I could not challenge the *Alabama* without violating orders. I however got one from Semmes to wait until he was ready (a quite unnecessary request since he knew that was my business). The *Kearsarge* carried into action 160 men, 7 guns, 2 Dahlgren's eleven inch, 1 light rifle twenty-eight pounder and four thirty-twos. The *Alabama* had eight, one more than the *Kearsarge*, consisting of 100 pounder rifle and heavy sixty-eight ditto, six thirty-two pounder guns. The *Alabama* had the coal bunkers filled, the *Kearsarge* was partly empty and her sides for twenty feet opposite the bunkers were hung with chains, stopped to eye bolts. This was done on board and the chains belonged to the sheet anchors and were put there as a sort of protection when the bunkers were out of coal.

"The *Kearsarge* steamed several miles seaward to prevent the *Alabama's* getting back and dispose of all questions of jurisdiction. Turning she started for close quarters with the *Alabama* and coming down received three broadsides of the *Alabama*, nearly raking [her] which it was necessary to get, to close in with her. No shot came on deck from this firing. The action lasted one hour and two minutes, when [the] *Alabama* struck, and it was well for her, for she would have been most destructively raked.

"The *Kearsarge* had some 28 or 29 shot above and below, some 5 or 6 aft mainmast which were the best two shells in her chains on the side which were of no importance. One shot of 100 lbs. in her stern post remaining (bad shot this). The *Deerhound* ran off with prisoners, which I could not believe any cur dog could have been guilty of under the circumstances, hence I did not open on him.

"We landed of *Alabama*, 63 men, 3 dead, 17 wounded. Have 5 officers prisoners.

"All twaddle about *Alabama's* firing going down. The vessel they say was a slaughter house, and when some of the men ran aft to prevent

the flags being hauled, Semmes took his pistol to blow out their brains—this is true and don't show there was any disposition to fire guns when sinking.

"We had 3 severely wounded. The *Alabama* has here now 74 men and officers—3 dead, making 77 of the number, 18 are wounded—39 were landed (officers and men) in England, making 116 in all. Of the 116 left about 20 are wounded and they say some 40 lost, killed and went down in the ship. For want of means for providing I was compelled to parole all except officers.

"This is a memorandum of the whole story, which I am sorry from the number of letters I have to answer, that I cannot put in another shape.

"I remain with thanks very truly yours,

"JNO. A. WINSLOW.

"THOS. H. DUDLEY, Esq., U. S. Consul,
Liverpool."

Mr. J. C. Bancroft Davis, in his recent interesting work, *Mr. Fish and the Alabama Claims; A Chapter in Diplomatic History*, has ably set forth Mr. Sumner's estimate of the damages inflicted on the United States by England, and though we may agree with Mr. Davis in his personal estimate of Sumner's character and ability, and especially that such a statement of damages was undiplomatic and impractical as regards any pending arbitrations, yet nevertheless we must allow that a large body of the American people felt that Mr. Sumner truly stated our wrongs. His was not an overestimate of the importance of these damages which are so far away they seem unreal to the present generation which unquestionably prolonged the war and produced the slaughter of thousands of our countrymen, who died by English bullets fired from English guns for whose death England was responsible.

Mr. Davis, quoting Mr. Sumner's speech in the Senate upon the Johnson-Clarendon Treaty for the settlement of the *Alabama* Claims, says: "Under the heading, 'The Case Against England,' he [Sumner] said: 'At three different stages the British Government is compromised; first, in the concession of ocean belligerency, on which all depended; secondly, in the negligence which allowed the evasion of the ship in order to enter upon the hostile expedition for which she was built, manned, armed and equipped; and thirdly, in the open complicity which, after the evasion, gave her welcome, hospitality and supplies in British ports. Thus her depredations and burnings, making the ocean blaze, all proceeded from England, *which by three different acts lighted the torch*. To England must be traced the widespread consequences which ensued.' What those widespread consequences were he set forth in detail under the heading, 'The Extent of Our Losses.' He estimated the loss sustained by the capture and burning of American vessels at about $15,000,000, on the authority of 'a statistician.' The loss in the carrying trade he put at $110,000,000. Then he said that, large as these losses were, there was another chapter

where they were larger far—'the national losses caused by the prolongation of the war and traceable directly to England,' and he clinched the statement by saying, 'If through British intervention the war was doubled in duration or in any way extended, as cannot be doubted, then is England justly responsible for the additional expenditure to which our country was doomed;' and he stated the cost of the suppression of the Rebellion at $4,000,000,000, thus leaving the calculation of this item plain to the youngest schoolboy."

"The feeling of hostility towards our country," Mr. Dudley said, "was not confined to one class, but pervaded all classes, the laboring and middle classes as well as the higher. Of the entire population of England, nine out of every ten sympathized with the slave-holders' Rebellion. I say nine out of every ten, deliberately. I am aware there are those in England who entertain a different opinion, and assert that among the laboring classes of the country the majority were with the North. I do not think so, and am satisfied the proportions I have given are correct. . . . .

"You can now understand how it was that this sympathy should become active and bear fruit in the recognition of belligerent rights to the rebels, in building them a navy, in fitting out cruisers to sweep our commerce from the seas, in furnishing arms and munitions to their army, and supplies to clothe and feed them. You can also understand why one of the leading blockade runners, whilst mainly engaged in the blockade business, was elected Mayor of Liverpool; why John Laird could be elected to Parliament from Birkenhead by an increased majority; and why Sheffield, a leading manufacturing town, trading with the United States, would send Roebuck as their representative.

"The effect of all this was to prolong, to intensify and render more bloody the war. Much of the blood that was spilt, much of the treasure that was spent, are justly chargeable to the Government and people of Europe who recognized the rebels as belligerents and gave them aid and comfort; and to this charge the people of England are especially obnoxious. But for this recognition, the South could not have had a cruiser on the ocean; but for this active aid and sympathy she could not have armed her men, or fed or clothed them when in the field. It was the hope of intervention that buoyed up the South, and cheered them on in the desperate contest. It was this that supplied fuel to the flame and kept the fire burning. But for this, in my judgment, the war could not have lasted for a year; and the probabilities are that the ninety days given by Mr. Seward for its termination would have witnessed the end, as he predicted."*

In 1867, the Government of the United States sent David A. Wells to Europe for the purpose of investigating the questions of production and labor in England, France, Belgium and Germany. Mr. Seward, at the instance of the Secretary of the Treasury, detailed Mr. Dudley to accom-

*See p. 11, *Proceedings at the Dinner Given by the Bar of New Jersey to Thomas H. Dudley, Esq.*, Nov. 25, 1868, Newark.

pany Mr. Wells. Of this appointment he says: "I therefore have been in many of the manufactories of Europe, and had an opportunity to study them and learn the wages and the condition of their working people."*

Returning to this country on a visit in the latter part of 1868, the members of the New Jersey Bar gave a dinner to Mr. Dudley on November 25, at Newark, in recognition of his distinguished services to the country, at which the late Mr. Justice Bradley, of the Supreme Court of the United States, Senators Frelinghuysen and Cattell, Chancellor Zabriskie, Attorney-General Robeson and many eminent persons were present. Mr. Bradley, introducing Mr. Dudley, spoke of him as a Jersey lawyer, whose professional career had ever been marked by the greatest promptness, assiduity and painstaking in the cause of his clients, and whose unfaltering patriotism and sympathy for the principles which on our part lay at the bottom of the struggle, pointed him out as the man to be implicitly trusted. And how well and nobly has he justified the confidence which President Lincoln reposed in him!" Mr. Bradley also enumerated the numerous vessels captured, sunk and detained through his watchfulness.

Mr. Frelinghuysen, on this occasion, spoke of the energy and perseverance with which Mr. Dudley had stood by the interests of his country amid difficulties and discouragements of no ordinary kind and in spite of the social coventry, to which, in company with others from the North, he was contemptuously dispatched during the progress of our civil war. "It is *something*," said he, "to do our duty when it is hard, and incurs the general opprobrium of those around; and honor should be given to him who faithfully performs his duty under such circumstances."

In 1871, Mr. Dudley proceeded to Geneva to attend the Court of Arbitration there and to assist the Government in regard to the *Alabama*. The English themselves appear to have been impressed with his character while endeavoring to controvert his important testimony concerning the *Florida* in the "Counter Case of Great Britain," at the Geneva Arbitration. We have the following (p. 299): "The American Consul at Liverpool, whose activity in hunting for secret information appears to have been indefatigable," and again (p. 301), "Mr. Dudley, though he appears to have been an intelligent and painstaking officer," etc. In short we may say that the subject of this sketch possessed that staunch quality which is the admiration of the Anglo-Saxon race all the world over, called "force."

The testimony of another Englishman on another occasion is also worth recording. Mr. James Spence, of the well-known firm of Richardson, Spence & Co., a citizen of Liverpool, said of Mr. Dudley: "My acquaintance with him commenced when he first came to Liverpool, and our friendship, I am happy to say, never varied. He filled a very responsible and onerous position in most troublesome times, with much prudence and discretion with credit to himself, and benefit to his Government."

*P. 19, *Speech at Astoria, N. Y.*, Oct. 23, 1884.

In 1872, after his service at Geneva, he was appointed Assistant Attorney-General of the United States to settle certain claims against the Government.

The Consulate of Liverpool, being both famous and lucrative, was eagerly sought even during his incumbency, but no pressure of the many office-seekers could induce the Government to remove him, he was too valuable a man for the place. At the time of his voluntary resignation in 1872, it is said there were no less than fifteen hundred applicants for the position. He had before repeatedly desired to resign when the war was over, but was told, by Mr. Seward, his services could not be spared, and begged to remain.

These are but a few of the incidents of national importance which occurred during his long sojourn of eleven years as Consul at Liverpool; they were closely interwoven with the history of his active life. Of minor importance were the opportunities the position gave him for social intercourse with his grateful countrymen, many of whom of the most distinguished character he entertained at his own house in Liverpool, of his frequent travels on the continent, and during this time his careful observation and study on the Tariff question gave him excellent and well-digested material for his numerous pamphlets on the subject written on his return, which are given in the bibliography below. These were widely circulated throughout the country. We wish to call attention to three of considerable political interest; that written in Liverpool, the case of the *Alabama* contrasted with that of the *Maury* at New York during the Crimean War, which pamphlet excited John Bright's just indignation;* the able reply to Augustus Mongredien's pamphlet† on the Tariff, which passed through many editions, and was in one especially commended by a letter from Peter Cooper, and the last paper which he wrote, *The Three Critical Periods in Our Diplomatic Relations with England During the Late War*. This is different in style and subject from the others, a

* In his *Three Critical Periods in Our Diplomatic Relations with England During the Late War*, Mr. Dudley (p. 17) says: "During the Crimean War in 1855, Mr. Barclay, the English Consul at New York, wrote Mr. Crampton, the English Minister at Washington, that he had reason to believe that the barque *Maury* was being fitted out in New York as a cruiser for Russia against England. Mr. Crampton wrote to the Secretary of State, Mr. Marcy, and he communicated with Mr. Cushing, the Attorney-General, who directed the United States District Attorney at New York to take immediate steps for the detention of the vessel, and this was done. In 1838, during the Canadian Rebellion, the United States, at the instance of England, passed a special Act of Congress to prevent our people from aiding the Rebellion. I prepared a pamphlet, containing the correspondence in the case of the *Alabama* and the barque *Maury*, and the special Act of Congress just referred to, to show the difference between the United States and England in enforcement of neutrality. I sent a copy of this pamphlet to all the members of the House of Commons, the leading members of the House of Lords and many of the prominent people in the kingdom. The English Government, in a dispatch dated September 25, 1863, addressed to Mr. Adams, refused to pass a new law to preserve its neutrality."

† The *Western Farmer of America*, by Augustus Mongredien, author of *Free Trade and English Commerce*. Cassell, Petter, Galpin & Co., London, Paris and New York. All rights reserved, 1880. 12mo, pp. 30. The second title page has the seal of the Cobden Club.

deeply interesting narrative from which a much better idea can be obtained of his career abroad than in any words we can give. It is a paper of ability in its department, equal though different from the others, and gives rise to a melancholy regret, that one who could write so well had not completed his story before death called him away.

On his return to his native country, in 1872, he purchased an estate, "The Grange," near Camden, and built a handsome house upon it. Here were frequently entertained perhaps the most distinguished company of men ever gathered together in West Jersey. General Grant, while President, with his family, also passed the day there on one occasion.

In "The Report of the New Jersey Commissioners on the Centennial Exhibition," * it is said of Mr. Dudley, who had been appointed on the Board of Finance in 1873, that he represented New Jersey "with great assiduity and ability." This important office was one which required constant attention for several years.

From this time he was actively engaged as President of the Agricultural Society of New Jersey; President of the Pittsburgh, Titusville & Buffalo Railroad, and of the New Jersey Mining Company; a Director in the Camden & Atlantic Railroad, the West Jersey Railroad, the Camden & Philadelphia Ferry Company, and of the Peoples Gaslight Company of Jersey City; first Vice-President of the American Protective Tariff League, etc., and President of the Bar Association of Camden.

On March 22, 1886, he was elected to membership in the Historical Society of Pennsylvania. In the American Philosophical Society he was a member of the Council in the years 1887, 1890, and 1893, also serving on numerous committees. In these two societies he was an active member and must have held membership in others which are unknown to us.

In short, his activity towards the end of a life of earnest work from his early youth, at a period when most men begin to show signs of age, was remarkable. During this time he wrote the numerous pamphlets whose titles we have given, and articles for the newspapers, besides taking part in political campaigns, making many speeches in his own State, in Pennsylvania, New York and Virginia, in behalf of the Republicans.

His death, in the seventy-third year of his age, was most unexpected and sudden. He was in such good health that he accepted an invitation to respond to a toast to be given on April the 25th to the Minister to Germany. A few days previous, seemingly strong and vigorous, early in the morning of April 15, 1893, arriving at the Broad Street Station, in Philadelphia, he died almost instantly from an attack of heart failure. He was buried at Colestown Cemetery, near Moorestown, where repose the remains of his wife and infant son and of many of his old friends and neighbors. This spot was his own choice, for he was greatly attached to early associations, which seemed strengthened by a long absence from home and a participation in stirring scenes abroad. The

* Trenton, 1877, p. 44.

Grand Army of the Republic of this district asked permission to place the flag upon his grave and to decorate it with flowers on Decoration Day, for they said he had served his country as faithfully as a soldier.

The immense fleet of vessels carrying arms and munitions of war which, through his instrumentality, were stopped or rendered harmless, and the fifteen million of the *Alabama* claims acquired largely through his vigilance and prompt evidence, and information of great value conveyed to the home Government, make his claims on his country's gratitude equal to those of a great general.

To sum up his personality, "Every one," says Cervantes, "is the son of his own work." His face, full of energy and decision, bore the impress of his life. In person he was tall, in dress and habits simple.

One of Mr. Dudley's biographers * gives a truthful account of some of his traits in the following: "Deeply religious in the Quaker sense, which makes each man alone responsible to his Maker and not to conventional ceremony, he was more spiritual minded than a practical prosaic lawyer and man of affairs would be taken to be, but never wore his heart upon his sleeve save to familiars. Hated by many through the prejudice and misconception engendered in political strife [as strong characters often are], misunderstood by many more because he would not stoop to conquer, he pursued the even tenor of his way in the respect and love of his confidants. Rarely heading public subscriptions, he was instant in good ways and works, and most of his generous benefactions were only known to the needy recipients."

An eminent member of the Bar of New Jersey † who knew him well thus describes him: "He was, as a lawyer, distinguished for the absolute devotion to the cause of his client with which he conducted his cases; no difficulty daunted and no obstacle deterred him. He persevered with indomitable energy and unceasing assiduity until his object was attained."

We close this sketch with a tribute to the character of Mr. Dudley from one for whose sound judgment we have the highest respect—the venerable Frederick Fraley, the President of this Society.

"No. 1000 Walnut St., Sept. 27, 1893.

"*My Dear Sir*:—I owe you an apology for not writing a reply to your letter relative to my acquaintance and friendship with our mutual friend Dudley.

"I find by reference to the minutes of the Centennial Board of Finance that he was elected a Director of that body in December, 1873. I then became personally acquainted with him, although I had known him by reputation as a great and useful man during our unhappy Civil War. My intercourse with him from 1873 until the date of his death was characterized by frequently meeting with him, participating in the work of the Centennial, and in many ways making our friendship of the strongest kind.

* H. L. Bonsall, in *The Post*, a daily paper of Camden, April 15, 1893.

† Mr. Samuel H. Grey.

"I had learned a great deal from him of the thrilling events which took place during his holding the Consular office in England, and I also had opportunities for testing the value and extent of the information he possessed of economic and business questions. His death was a severe blow to me, and unexpectedly severed the ties which had bound us together for nearly twenty years.

"He spent a morning with me and my family a few days before his death, and we were all wonderfully impressed with his kindly manners and the interest which he gave on that occasion to our Sunday morning gathering.

"This made for him with us a glorious sunset for such a life, and I am truly thankful that I was permitted to have such a friend.

"Sincerely yours,

"FREDERICK FRALEY.

"WM. JOHN POTTS, Esq.,
Camden, N. J."

BIBLIOGRAPHY.

1. Correspondence Respecting the *Alabama*, also Respecting the Bark *Maury*, at New York, During the Crimean War; and The Temporary Act of Congress Passed by the United States at the Instance of Great Britain, in 1838, to Meet the Case of the Rebellion in Canada. [1862.] 12mo, pp. 56. (This contains several letters by Mr. Dudley and others relating to the *Alabama's* history which are extremely important.)
2. Proceedings at the Dinner Given by the Bar of New Jersey to Thomas H. Dudley, Esq., November 25, 1868. Newark · Printed at the *Daily Advertiser* Office, 1868. 8vo, pp. 18. (This contains the speech of Mr. Dudley, etc. See pp. 4 to 16, inclusive.)
3. Protective Tariff and Free Trade. By Hon. Thomas H. Dudley (late United States Consul to Liverpool). Printed by J. B. Lippincott & Co., Philadelphia, 1880. 12mo, pp. 13. (Apparently the first edition. This is in the form of a letter to "Charles Edwin [*sic*] Rawlins, Esq., Liverpool," dated "Camden, N. J., January 20, 1880.")
4. Protection or Free Trade for the United States of America? Discussed in Two Letters between the Hon. Thomas H. Dudley, Ex-United States Consul to Liverpool, and Charles Ed. Rawlins, an Ex-President of the Chamber of Commerce, Liverpool. *Audi alteram partem.* Second Edition, 1880. 12mo, pp. 29. The Argus Printing and Stationery Company, Limited, 31 Dale Street, Liverpool.
5. Please Read and Circulate. Reply to Augustus Mongredien's Appeal to the Western Farmer of America, Showing the Prosperity of America under Protection and the Decline of England under Her So-called Free Trade System. By Hon. Thomas H. Dudley (late

United States Consul at Liverpool). 12mo, pp. 48. Printed by J. B. Lippincott & Co., Philadelphia, 1880.

6. Tariff Tract No. 12, 1880. Published by the American Iron and Steel Association at No. 265 South Fourth street, Philadelphia, at which place copies of this tract may be had free, for distribution, on application by letter.

   Protection to Home Industry. Shall England Interfere in Our Elections and Make Our Tariff Laws for Her Benefit? Reply to Augustus Mongredien's Appeal to the Western Farmer of America. By the Hon. Thomas H. Dudley, of Camden, N. J. (late United States Consul to Liverpool). 8vo, pp. 24. (Appears to be a reprint of No. 5.)

7. Errors and Appeals. Edward Dudley *vs.* Camden and Philadelphia Steamboat Ferry Company, in Error, Etc. Thomas H. Dudley, Counsel. 12mo, pp. 18. (One of the so-called "paper books," printed in 1882, probably.)

8. Court of Errors and Appeals. Benjamin F. Davis *vs.* the Township of Delaware, in Error. Brief of Plaintiff in Error. Thomas H. Dudley of Counsel for Plaintiff in Error. [No date.] 12mo, pp. 16. ("Paper book.")

9. The Farmer Feedeth All. How Protection Affects the Farmer. An Address Delivered before the New Jersey State Agricultural Society, at Waverley, September 22, 1882. By Hon. Thomas H. Dudley, Philadelphia. Allen, Lane & Scott's Printing House, Nos. 229–231 South Fifth Street [Phila.], 1882. 8vo, pp. 16. (This was also printed by the Republican National Committee, campaign of 1884, Document No. 4.)

10. Please Read and Circulate. Copies may be had by addressing Thomas H. Dudley, Camden, N. J. Reply to Augustus Mongredien's Appeal to the Western Farmer of America, Showing the Prosperity of America under Protection and the Decline of England under Her So-called Free Trade System. By Thomas H. Dudley (late United States Consul at Liverpool). With Peter Cooper's Letter Endorsing the Same. 8vo, pp. 48. Allen, Lane & Scott's Printing House, Nos. 229–231 South Fifth Street [Phila.], 1883. (A note on the second page of the cover says, giving a letter from Peter Cooper, of New York: "This endorsement of Mr. Cooper's and the pamphlet of Mr. Dudley's were published in the *Justice*, of New York, and *National Farmer*, of Washington.")

11. A Reply to Kersey Graves' Comparison between Protection and Free Trade in the United States. By Thomas H. Dudley (late United States Consul at Liverpool). [1883.] 8vo, pp. 11.

12. An Address Delivered Before the New Jersey Board of Agriculture, February 6, 1883. By Thomas H. Dudley, President. Printed by Order of the Board of Agriculture, Camden, N. J. 8vo, pp. 16. The Millette Printing Rooms, No. 21 Federal Street.

13. The Cobden Club of England and Protection in the United States. A Speech Made at a Republican Meeting Held at Astoria, New York, October 23, 1884. By Thomas H. Dudley, of Camden, N. J. (late United States Consul at Liverpool, England.) 8vo, pp. 32.
14. Competition of India Wheat; Cause of Decline in Price; to Supersede American in English Market. The Remedy. From Address Before the State Board of Agriculture of New Jersey, February 3, 1885. By Thomas H. Dudley, President (late Consul at Liverpool). 8vo, pp. 14. Camden, N. J.: S. Chew, Printer, Front and Market Streets, 1885.
15. Address of Thomas H. Dudley, President of the State Board of Agriculture. Delivered before said Board at Trenton, February 2, 1886. 8vo, pp. 16. Camden, N. J.: S. Chew, Printer, Front and Market Streets, 1886.
16. Is There Reciprocity in Trade? And the Consumption of Manufactured Commodities. By Thomas H. Dudley. Read before the American Philosophical Society, October 1, 1886. 8vo, pp. 9.
17. Which is Best for the Farmers, Protection or Free Trade? An Address before the Agricultural Society of Lancaster County, Delivered at Lancaster City, Pa., February 7, 1887. By Thomas H. Dudley, of Camden, N. J. Answer to Col. Beverley, of Virginia, and Hon. Frank Hurd, of Ohio. 8vo, pp. 24. (Issued by the American Protective Tariff League.)
18. The Farmers and the Tariff. A Speech Delivered at the Meeting of the Farmers' Congress at Chicago, November 11, 1887. By Thomas H. Dudley, of Camden, N. J. 8vo, pp. 16. Philadelphia: Allen, Lane & Scott's Printing House, ... 1887. (Reprinted as a campaign document in the *Defender*, New York, July 2, 1892.)
19. How Abraham Lincoln was Nominated. An Article in the *Century Magazine* for July, 1890. Reprinted in *The Bulletin of the American Iron and Steel Association*, Philadelphia, July 16, 1890, No. 26.
20. Letter on Agriculture as Affected by the Tariff. *North American Review*. pp. 2.
21. What is Protection? Symposium for a New York paper. Signed at the end, Thomas H. Dudley, Camden, August 30, 1890. 12mo, pp. 2.
22. A Comparison between England under Free Trade and the United States under Protection. By Thomas H. Dudley (late United States Consul at Liverpool). 8vo, pp. 8. Philadelphia: Allen, Lane & Scott's Printing House, 1892.
23. Three Critical Periods in Our Diplomatic Relations with England During the Late War. Personal Recollections of Thomas H. Dudley, Late United States Consul at Liverpool. Reprinted from the *Pennsylvania Magazine of History and Biography*, April, 1893. 8vo, pp. 22.

SUPPLEMENTARY.

The following valuable letter was received to-day (May 16), too late for insertion in the foregoing, and as it forms an historical paper of especial interest, written by one of the last three survivors of the Emancipation Society of Liverpool's Committee of Twenty-five, the Honorary Secretary Col. Robert Trimble, now of Taranaki, New Zealand, who has been a member of Parliament there, and has held numerous political offices, it is an excellent supplement to the foregoing. The letter is addressed to Mr. Thomas H. Dudley's sister-in-law, Miss Matlack.

Col. Trimble was the author of several pamphlets explaining and sympathizing with the action of the North, which we give in a footnote.*

W. J. P.

"INGLEWOOD, TARANAKI, NEW ZEALAND, April 18, 1895.

"*My Dear Miss Matlack:*—Mrs. Trimble has passed to me your letter of February 24 to be answered. I need hardly say that I am glad that Mr. Dudley is to have a fitting biography. Upon it could be grafted a whole history of the exterior attitude of the United States. The work passed over to Mr. Dudley was to all appearances overwhelming, and was without precedent for guidance. It looked many a time as if he would break down, so heavy were the odds. A passionate love for his country, and a temper singularly equable, carried him over or around all his difficulties.

"I now, in accordance with your request, send you a few memories of men and movements, looking tame enough now, after the lapse of over thirty years, but once instinct with life and redolent of human hopes. Nor was fear wanting. During the great epic struggle between the powers of light and of darkness there were times when it almost seemed as if the darkness had won. Hence we used to say, 'We do not say the North shall win, but we say it ought to win.'

"Never during the tempest did Mr. Dudley despair of the State. The news was sometimes cruelly bad, but he always carried a head erect and a heart undaunted.

**Slavery in the United States of America.* A Lecture delivered in Liverpool, December, 1861, by Robert Trimble.

The Negro North and South. The Status of the Coloured Population in the Northern and Southern States of America Compared. By Robert Trimble.

Popular Fallacies Relating to the American Question. A Lecture delivered in November, 1863, by Robert Trimble. 12mo, pp. 36.

A Review of the American Struggle in the Military and Political Aspects, from the inauguration of President Lincoln, 4th March, 1861, till his reëlection, 8th November, 1864. By Robert Trimble. 12mo, pp. 48.

The Present Crisis in America, by Robert Trimble. 1865. 12mo, pp. 10.

These pamphlets were printed, London: Whittaker & Co.; Liverpool: Henry Young; Manchester: Abel Heywood & Son.

PROC. AMER. PHILOS. SOC. XXXIV. 147. Q. PRINTED MAY 29, 1895.

"I will now proceed with my discursive narrative. Previous to President Lincoln's Proclamation in favour of certain forms of Emancipation, which was to take effect on first of January, 1863, there was a very general feeling throughout England that the war between North and South was not likely to issue in the abolition of slavery, if the North proved victorious. The British people are not, as a rule, well informed upon matters taking place abroad, and are therefore at times liable to make serious mistakes. When the Southern partizans proclaimed that their object was to get rid of the Protective System in the Tariff: and the Northern orators and writers kept dinning that the sole object of the North was to keep intact the Union, the people of this country were dazed. They could not understand the nice distinctions of lawyers as to what was Constitutional and what was not. When it was argued that the whole tendency of the war made for freedom, and at the same time, that the authorities could not constitutionally enact emancipation by a vote of Congress, a shrug of the shoulder sufficiently showed incredulity. When, however, President Lincoln issued the Proclamation above referred to, it had an instantaneous effect, and the friends of the United States were able to speak and write with a confidence they never before had experienced. It is true that in the north of England, and particularly in Lancashire, there was a strong feeling that the action of our government should in no way be twisted into a support of the Slave States; and from the time of the sailing of the *Alabama*, in August, 1862, this feeling rapidly assumed a definite shape. When, therefore, the President's Proclamation reached England the friends of Emancipation saw that the time for united action had come. This was recognized in Manchester sooner than in Liverpool, and this was natural, for Manchester was filled with workingmen who had proved by their conduct all through the struggle that they held that man was not to live by bread alone. In the midst of want they stood firmly by their convictions. In Liverpool, on the other hand, the cotton trade was predominant. Men 'on change' were unmistakably 'Southern' in their proclivities, that is, the majority of them. The mere rabble took the same side. All that these could understand was that whereas they formerly earned a comfortable living in handling imported cotton, they were now idlers living on the rates, or depending upon very precarious employment. To them 'cotton' was still 'king.' The Emancipationists in Manchester had the masses to aid them, and they therefore took action first, by establishing an Emancipation Society. In Liverpool the rich and the lowest were acting together, whilst the great body of shopkeepers and the handicraftsmen were favorable to the North. Of course these classifications must be taken as only approximately accurate.

"Such was the state of feeling in Liverpool when an advertizement appeared in the newspapers calling a meeting to assemble in the 'Clarendon Rooms,' early in the afternoon of the 17th January, 1863. I was present and was surprised to find so many influential merchants in

attendance. Not knowing many of them, I guessed that the South was largely represented, and that not unlikely sympathy with the North would be a minus quantity. The chair was taken by Mr. John Cropper, a man deservedly respected in Liverpool and far beyond, for his deeds of benevolence. I think it was Mr. Robertson Gladstone (elder brother of Mr. William E. Gladstone) that moved the following resolution :

"'That in the opinion of this meeting the war now raging in the United States of America originated in the institution of slavery and in the antagonism which that system inevitably presents to the institutions of freedom ; that in the great national crisis now created by the announcement of the Emancipation policy, the Federal Government is entitled to the generous sympathy of every Englishman, and to the moral support which such sympathy always affords ; that to ensure these from the inhabitants of Liverpool it is now deemed advisable, by means of lectures and public discussions, to fully instruct the public mind on the true conditions of the American question, preliminary to a general aggregate meeting for the adoption of an address to President Lincoln.'

"A debate of an interesting character sprung up. Mr. James Spence,* the S of *The Times* and author of *The American Union*, was present, and in eloquent terms denounced the hypocrisy of the North and praised the chivalry of the South. Slavery was pronounced 'scriptural' and 'patriarchal,' and poor Onesimus was trotted out once more to prove that injustice is the very highest form of justice. He sat down with an air of triumph which I can never forget. Applause was loud and continuous. Before it was over a man that I then only knew by name, but knew intimately ever after, was on his feet waiting for attention. Mr. Spence was a dainty-looking little man, with a pleasant voice and graceful presence. The man about to reply (John Patterson by name) was a burly Ulsterman with loud voice and energetic action. As soon as Mr. Patterson got a hearing he took a little Bible out of his pocket and first addressed himself to the task of answering the Scriptural arguments of Mr. Spence. He made the house ring with denunciations of man-stealers and of oppressors of the poor. The year of jubilee was not forgotten—in fact, the little pocket-Bible had the effect of a gigantic bomb-shell. Neither before nor since have I heard so able an *ex tempore* rejoinder. There was no occasion for further discussion. The resolution was put and carried almost unanimously. An Emancipation Society was founded and a committee formed to carry out the objects of the resolution. On the motion of our old friend, Mr. C. E. Rawlins, I was asked to be Honorary Secretary, and thus came my official connection with the Society which lasted till the end of the war.

"As you wish to know the names of those most active amongst us, I give

* [A different person from the James Spence of the firm of Spence, Richardson & Co., of Liverpool, whom we have mentioned elsewhere in the foregoing article, a strong friend of the United States.—W. J. P.]

the names of the Committee as follows, reserving a few words to be said about two or three of them afterwards :

Rev. J. S. Jones,	Mr. John Turner,
" Hugh S. Brown,	" T. R. Arnott,
" Charles M. Birrell,	" Peter Stuart,
" John Robberds,	" David Stuart,
Mr. John Cropper,	" George Golding,
" I. B. Cooke,	" Robert Varty,
" Denis Duly,	" Andrew Leighton,
" Robertson Gladstone,	" E. K. Muspratt,
" James R. Jeffery,	" Maurice Williams,
" John Patterson,	" William McGowan,
" Charles E. Rawlins,	" Charles Wilson,
" Charles Robertson,	" Robert Trimble.
" Richard Sheil,	

"Besides the above named there were many others that both worked hard and subscribed liberally to our objects, such as the late William Crosfield and his two sons, Thomas Ellison, S. Bully, etc.

"The committee lost no time in beginning its work. In every district of the town meetings were held preparatory to a great central demonstration at the Amphitheatre. We were followed everywhere by paid organizers of disorder; but notwithstanding this opposition we carried our resolutions at every meeting, including that at Birkenhead.

"On Thursday evening, 19th of February, we held a great meeting at the Amphitheatre, where we had much organized opposition; but all our resolutions were carried. We had many other occasions for demonstrations and plenty of private work. It is a remarkable fact that our opponents never had a public meeting from the opening of the war till the end.

"Perhaps I ought to say something of the meeting to hear Mr. Beecher; but the truth is I had no faith in its success, and although we carried our resolutions by overwhelming majorities, yet I think it did us no good. He did not understand his audience, and was too 'bumptious.'

"You ask about garments made for the fugitive negroes by my wife and other ladies. I have no particulars of the work done. I have a memorandum written on one of my pamphlets showing the final result of the efforts for the Freedmen and I have the original subscription list somewhere. I saw it quite recently amongst some papers, but for the moment cannot find it. The figures are :

Cash subscriptions	£2170 2s. 0d.
Computed value of clothing	362 19 9
Total	£2533 1s. 9d.

"After the war closed I thought we might get up a fund of £10,000, but on the advice of Mr. Dudley I dropped the idea. Some time afterwards a gentleman called upon me one morning with a note from his father enclosing £50 to be given to certain American travelers if I thought well of it. The son said that if I thought it desirable, his firm would give £1000 to begin a subscription worthy of the town. I sent once more to Mr. Dudley, giving him in confidence the name. After mature thought, he again gave an opinion similar to that he had given before. Neither of these gentlemen had joined our agitation.

"With regard to Mr. Dudley's eleven years' work in Liverpool, I would like to say that I had the good fortune to enjoy his friendship from the middle of the war until he resigned his office of Consul, and can say that he was an indefatigable worker, though all the time labouring under great physical disabilities. He kept a strict watch upon the enemies of the United States, and at the same time was urbane to all who had any business at the consulate. When the full history of that revolutionary period comes to be written his name will be found amongst the most honourable.

"A life perhaps too busy has prevented me from keeping documents concerning passing events, but what I have here written is from memory aided by some odds and ends and preserved letters. I have purposely abstained writing about war ships, blockade runners, confederate bonds and so on, as, if I began, it would require volumes to finish the story. In hunting through old papers in the last few days I find I have still a pretty complete set of my letters exposing the celebrated cotton loan. I am glad to think that the eventual sufferers were not unwarned both from the commercial and the moral side.

"My pamphlets are out of print, so I cannot send you a set, but I find I have a few copies of the three latest and I send you two of each of them.

"You ask for a few incidents which might prove interesting. I have given you one about our old friend, John Patterson, but now recall his name to say that he kept full reports of every meeting held, and all published correspondence that he noticed. I dare say his family has them.

"Charles E. Rawlins wrote the best book brought out amongst us. It is called *American Disunion*. It was published in April, 1862. It has only one fault. He shows himself quite too charitably disposed to his opponents; but that was his constant characteristic. You may have the book in your library.

"Thomas Ellison, a cotton broker, wrote a book called *Slavery and Secession*. It was published just before that by Mr. Rawlins.

"The Rev. J. S. Jones was remarkable for his broad sympathies. He was very 'high church' in his views, but he visited, preached in, and lived in the vilest part of Liverpool, and at a nominal salary. I believe he has now similar surroundings in London. He stood second to none amongst our friends.

"The Rev. Charles M. Birrell was a leading Baptist minister, and joined us on account of the moral aspect of the question at issue. He

spoke at our Amphitheatre meeting. He was a very retiring man, but he was roused to vehemence when the mob tried to howl him down. I can never forget the close of his speech. He said that in the old anti-slavery agitations he had stood in the same place and had to face a similar hostile multitude; and then rising to his full height, his face aglow, and lifting his right hand towards heaven, he said, 'We conquered then and we will conquer now.' He touched a chord that vibrated throughout the vast assembly.

"A word or two about Charles Wilson, and I have done. He was a veritable 'Fighting Quaker,' if ever there was one.

"He was Chairman of our Executive Committee, and to him was largely owing the aggressive attitude assumed at the beginning and continued till peace was proclaimed. With all this never man could be more reckoned upon to keep his temper. His services to the cause were beyond praise.

"Perhaps it looks a little insidious to pick out a few, out of many friends, for special mention; but these were serviceable above measure.

"Of the twenty-five members of the committee as already given in list, I believe twenty-two have gone to their rest—their work done. I believe I am right in stating that Messrs. Jones, Muspratt and I, are the last survivors; and of Mr. Jones, I am not quite sure as it is a dozen years since I have heard of him.

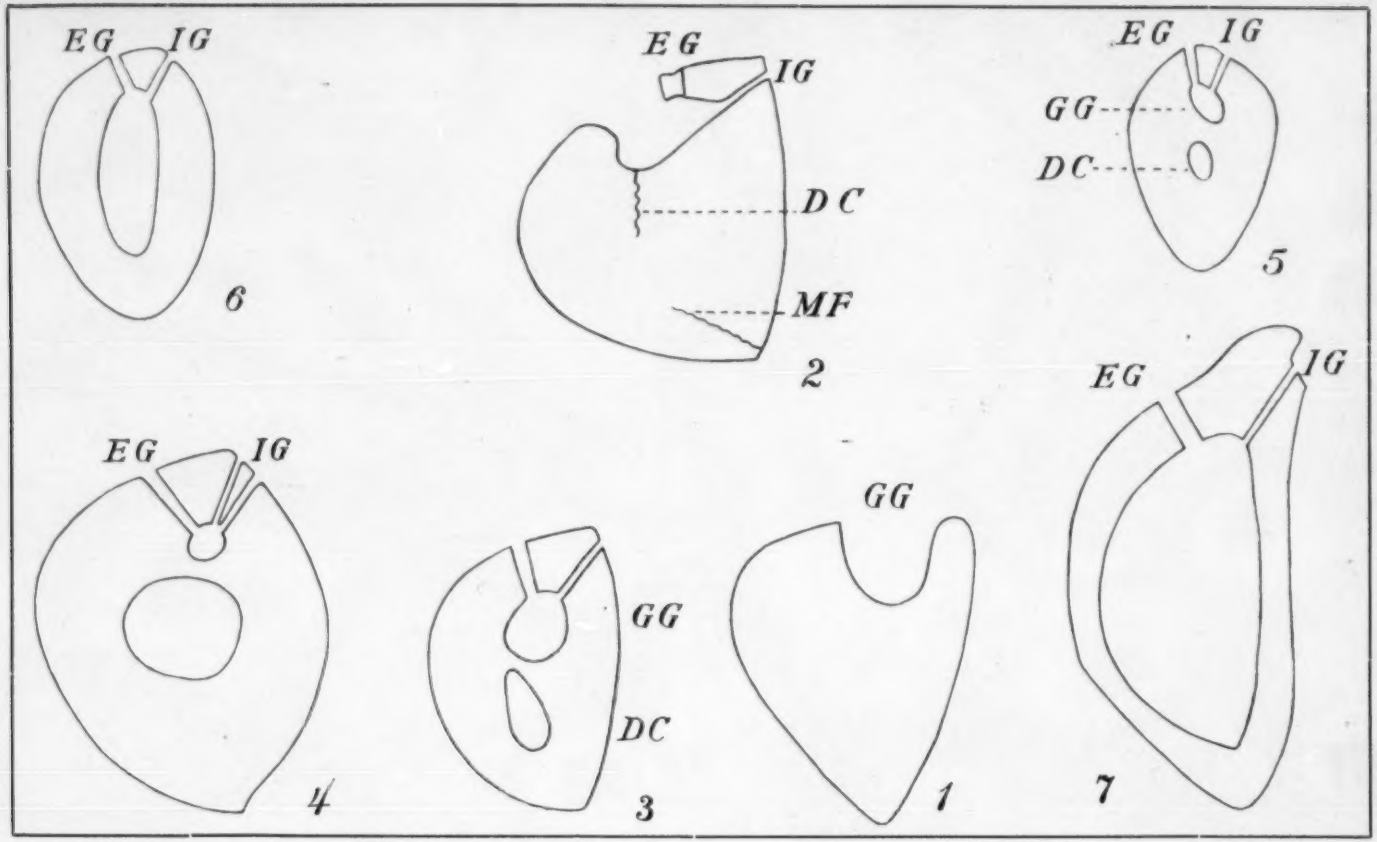
* * * * * * * * * * * * * *

"I remain, my dear Miss Matlack,

"Yours sincerely,

"ROBERT TRIMBLE.

"MISS MATLACK, The Grange,
Camden, N. J."



Sections of Mandibular Rami of Balænidæ.

Fourth Contribution to the Marine Fauna of the Miocene Period of the United States.

By E. D. Cope.

(*Read before the American Philosophical Society, April 5, 1895.*)

The three preceding "Contributions" appeared in the *Proceedings of the Academy of Natural Sciences of Philadelphia* for the years 1867, 1868 and 1869 respectively. Their subject matter is almost exclusively confined to the description of the remains of Cetacea which occur in the marine deposits of middle Neocene age of the Atlantic coastal region, and more exactly, in the Yorktown formation of Dana, or the Chesapeake formation of Darton and Dall. The present paper continues the description of these forms preliminary to an illustrated memoir on the subject. The word "marine" has been introduced into the title to distinguish the series from the numerous papers which have appeared on the paleontology of the lacustrine neocenes of the West. For the sake of uniformity the term Miocene is retained.

PHYSETERIDÆ.

PARACETUS MEDIATLANTICUS, sp. nov.

The genus Paracetus has been recently proposed by Lydekker* to include members of this family which possess a well-developed series of teeth in the (?) premaxillary and maxillary bones. It is up to the present time represented by one species, the *Paracetus pouchetii* Moreno, of the Santa Cruz bed of eastern Patagonia, of the district of Chubut. The present species is apparently not distantly related to that one.

This genus stands near to Cogia Gray, and can scarcely, with present information, be referred to a distinct family. The presence of superior teeth cannot alone be regarded as necessitating this course, as they occasionally occur in Cogia. Thus in *C. sima* Owen, from the coast of India, there are two teeth at the anterior extremity of the upper jaw, and a male of a rather small species preserved in the U. S. National Museum from the eastern coast of the United States exhibits the same character.† A male in the Museum of the Wistar Institute of the University of Pennsylvania‡ from the coast of New Jersey at Sea Isle City, has no teeth in the upper jaw. The genus Paracetus seems to me to be only distinguishable from Cogia by the posterior extension of the tooth series to the posterior

* *Anales del Museo de la Plata: Paleontologia Argentina*: II: *Cetacean Skulls from Patagonia*, p. 8, Plate iii.

† For the opportunity of examining this specimen I am indebted to Dr. Goode, Director of the Museum.

‡ My thanks are due to Prof. Horace Jayne, Director of the Wistar Institute, for the opportunity of studying this specimen.

part of the maxillary bone. Perhaps when the skeleton is known other characters will be detected.

The name of this genus is stated by Dr. Lydekker in the text of his description to be as I have cited, but the name Hypocetus stands at the top of the paragraph in which this statement is made, and is also attached to the plate in which it is figured. I have followed Dr. Lydekker's expressed intention rather than what may be a *lapsus calami* or other mistake.

Char. specif.—As the posterior border of the skull and the extremity of the muzzle of the specimen are broken off, an exact idea of its outline cannot be given. However, the form was probably much as in the *P. pouchetii*, and more elongate than in the species of Cogia. This form is subtriangular, with the basal border convex, and the two lateral ones slightly concave. The muzzle is probably, however, produced into a rostrum, as the maxillary borders are parallel at the point where it is broken off. On the right side, where the maxillary bone is best preserved, there are eight alveoli; the teeth are lost. The lateral border of the maxillary bone overhangs the tooth line considerably in front, and spreads away from it outwards and backwards in a gradually thinner edge to the deep notch which bounds the supraorbital region anteriorly. The rise of the anterior border of the facial basin is within this notch, and not without it, as in the species of Cogia; and is gradual, attaining a considerable elevation immediately in front of the temporal fossa, and a little within the vertical plane of the supraorbital border. The premaxillary bones are separated by the deep vomerine channel which they partially overroof on each side, and are separated posteriorly by the prenarial part of the vomer posteriorly. The latter forms an elevated crest directed forwards and unsymmetrically to the right. The premaxillaries spread gradually outwards posteriorly to a thin margin, and are concave opposite to the vomerine crest which separates them, that of the left hand descending to the nareal orifice. The skull is broken off at the blow-holes, so that it is difficult to affirm positively whether the right blow-hole existed or not. It was apparently present, but smaller and posterior in position to the right one. The inferior surface of the maxillaries slopes upwards and outwards, leaving the inferior face of the vomer quite prominent below. The vomer forms the half of a circle in transverse section above, and extends as far anteriorly as the specimen extends.

There is a large supraorbital foramen between the preorbital notch and the rising edge of the facial crest, as in the sperm whale; and there is a smaller one in a direct line posterior to it just exterior to a more elevated part of the crest, within a line above the posterior part of the supraorbital border. A longitudinal groove anterior to the supraorbital foramen is pierced in its fundus by two foramina. Anterior to the groove a depressed foramen pierces the maxillary bone near the premaxillary border. Anterior and interior to the corresponding foramen of the left side a depressed foramen pierces the premaxillary bone. This foramen is absent from

the right side. In the other hand the right premaxillary is pierced near the anterior part of the vomerine crest by a large round foramen, which is wanting from the left side. A large foramen pierces the inner side of the lateral crest half-way to the superior border, and opposite the middle of the left blow-hole.

The dental alveoli are subround, and are separated by narrow septa. They are not deep, the deepest equaling 50 mm., so that the teeth have been easily lost.

Measurements.

	M.
Length of fragment on middle line	.800
Width of skull at supraorbital notch; left side restored	.800
Width of muzzle where broken off	.172
Width of right premaxillary at middle of length	.100
Width of left premaxillary at middle of length	.150
Width of right premaxillary at vomerine keel	.100
Width of left premaxillary at vomerine keel	.170
Elevation of lateral crest above orbit (apex broken off)	.310
Length of series of eight teeth	.165

From Drum Point, Chesapeake Bay, Maryland.

CHONEZIPHIIDÆ.

Ziphiinæ Flower; *Ziphiidæ* Gill (*Ziphius* preoccupied).

PELYCORHAMPHUS PERTORTUS, gen. et sp. nov.

Char. gen.—Allied to Choneziphius, but the solid rostrum of the vomer bifurcates posteriorly and embraces a basin which takes the place of the maxillary basin of the right side, and reduces that of the left side to very small dimensions. Blow-holes very unsymmetrical, the left only preserved in the specimen.

This genus has certain characters which ally it to the Physeteridæ. The internareal part of the vomer is directed very obliquely upwards to the left, and then forwards to the left on the superior surface for a distance, when it turns to the right as in Paracetus and Cogia. Instead of terminating at this point as in those genera, it assumes the swollen form and dense structure seen in the species of Choneziphius, and besides sending forwards the usual rostrum on the median line, it continues to the right, and apparently spreads out into a thin plate which forms the floor of a wide basin, and which apparently continues to and forms its right border, overlying the posterior plate of the maxillary. This basin is represented in *Paracetus mediatlanticus* by a longitudinal shallow concavity of the right side of the superior keel of the vomer, which is a rudiment as compared with the basin in the present genus. The rostrum of the vomer extends to the narrow extremity of the specimen, where it is broken off. The fracture exhibits no tube or channel.

It would not be surprising if this genus should prove to be related to Anoplonassa Cope, which has the long symphysis mandibuli of the Physeter, with the nearly edentulous character of the Choneziphiidæ.

Char. specif.—The species is founded on a rostrum similar in its mode of preservation to Ziphioids in general. Nothing is preserved posterior to the nares, and the edge of the left maxillary, with the end of the muzzle, is broken off. All the parts are coössified.

The anteroposterior diameter of the basin exceeds by a little the transverse. The bottom is nearly regularly concave, with a few shallow fossæ at the right side. The part of the median vomerine ridge which forms the anterior half of the left border of the basin is thicker than that which bounds the posterior half of the same, and it presents an angular tuberosity horizontally to the left. The fractured edge of the left maxillary shows that it was thin at this point, and at no point had it when perfect any considerable horizontal extension to the left side. It is separated from the vomerine ridge by a groove, which extends from the left maxillary basin to a foramen, which is situated at a point in advance of the greatest width of the vomerine rostrum. A corresponding foramen exists on the right side, which is opposite the anterior border of the central basin. The vomerine rostrum contracts rapidly forwards, forming a prominent rounded ridge, and the premaxillaries rise to it on each side. The maxillaries are little expanded, and their superior surface is subhorizontal and is moderately rugose. It is much thicker on the right side than on the left, and is probably also wider on the right side. On the left side it is bounded below by a deep groove from opposite the anterior part of the left maxillary basin to a point in front of and below the supramaxillary foramen of the same side already described. On the right side there is a similar foramen which bears the same relation to the supramaxillary foramen of the same side. In front of the foramen on the left side the groove continues. On the right side the groove does not continue, but is succeeded forwards by a narrow vertical wall to the anterior extremity of the specimen.

On the inferior side the middle line is deeply grooved to a point opposite the middle of the superior median basin. On each side of the groove the palatal aspect of the maxillary slopes slightly upwards, and on the left side rolls up to a thickened inferior border of the inferior or submaxillary groove. On the right side the palatal face of the maxillary turns up more obliquely to the border of the superior median basin.

Measurements.	MM.
Total length of specimen	330
Length from front of median basin	150
Inside diameters of median basin.. anteroposterior	160
Inside diameters of median basin.. transverse	130
Depth of basin	64
Width of rostrum in front of basin	80

Measurements.	MM.
Width of rostrum at end of specimen	35
Width of lateral edge of right maxillary at inferior maxillary foramen	25
Length of inferior keel of vomer	120

This species exhibits the most unsymmetrical cetacean cranium known to me. Its size was probably about that of the *Choneziphius indicus* of the present ocean. Its exact locality is unknown, but it probably was exposed to the action of water for a considerable time, after being washed from its position of deposit. It has been bored by Pholades in several places.

BALÆNIDÆ.

I have remarked that the Mysticete with its single family the Balænidæ * "would seem to have derived their descent from some form allied to the Squalodontidæ, since their nasal bones are more elongated than those of the Odontoceti, and in Plesiocetus" (Cetotherium) "the superior cranial bones show some of the elongation of that family." This elongation of the superior cranial wall is not seen in the genus Squalodon, but is moderately developed in the genus Prosqualodon of Lydekker, founded on the *P. australis* Lydd. (*l c.*) from Patagonia. It is exhibited in a still more marked degree by the genus Agorophius g. n. Cope, which is represented by the *Zeuglodon pygmæus* of Müller, which was referred to Squalodon by Leidy.† The form of the skull in this genus approaches distinctly that of Cetotherium of the Balænidæ, and the permanent loss of the teeth would probably render it necessary to refer it to the Mystacocete.

Stages of transition from some such genus as Agorophius to the typical whalebone whales are represented by several genera from the Yorktown beds. Theoretically the loss of teeth *by failure to develop* would be accompanied by the loss of the interalveolar walls, leaving the dental groove continuous and separate from the dental canal. A genus displaying these characters has not been discovered, but I have no doubt that it will be. The new genus Siphonocetus Cope exhibits the groove roofed over by ossification of the gum, and distinct from the dental canal. The genus Ulias indicates that a still farther degeneracy took place, in the fusion of the dental groove and dental canal, while the groove remained open. In Tretulias the same condition persists with the addition that the gingival passages and foramina are present, as in the genus Siphonocetus, and in

* "On the Cetacea," *American Naturalist*, 1890, p. 611; Meyer, *Studien über Säugethiere*, Jena, 1886, p. 191.

† *Extinct Mamm. Dakota and Nebraska*, 1869, p. 420, Pl. xix, Fig. 8. It is doubtful whether this genus should be referred to the Zeuglodontidæ or the Squalodontidæ. The relations of the maxillary and premaxillary bones posteriorly resemble most those of the latter family. It differs from Prosqualodon in the contact of the temporal fossæ on the middle line above, and in the greater elongation of the frontal and probably nasal bones.

the later genera. In Cetotherium and in later Balænidæ the groove and canal are fused, the gingival roof is complete, and it is perforated. It would appear, then, that Ulias may be descended from the undiscovered genus above mentioned, while Tretulias is descended from Siphonocetus. The exclusively Neocene genera may be tabulated as follows :

I. Alveolar groove and dental canal distinct.

Alveolar groove open.....Not discovered.
Alveolar groove roofed over and perforate.....*Siphonocetus* Cope.

II. Alveolar groove and dental groove confluent in a gingivodental canal.

Gingivodental canal open ; no gingival canals.....*Ulias* Cope.
Canal open ; gingival canals at one side.....*Tretulias* Cope.
Canal with complete and perforate roof.....*Cetotherium* Brandt.

SIPHONOCETUS PRISCUS Leidy, gen. nov. *Balæna prisca* Leidy, *Proceeds. Academy Philada.*, 1854, p 308. *Eschrichtius priscus* Leidy, Cope, *Proceeds. Acad. Philada.*, 1869, 11. Leidy, *Extinct Mamm. Dakota and Nebraska*, 1869, p. 441. *Infra* Plate vi, Fig. 3.

Specimen in Museum of Academy of Natural Sciences of Philadelphia.

SIPHONOCETUS EXPANSUS Cope. *Eschrichtius expansus* Cope, *Proceeds. Acad. Philada.*, 1869, p. 11.

The two mandibular rami ascribed to this species are the property of the Maryland Academy of Sciences. The collection of Johns Hopkins University contains a fragment of a ramus of an individual of rather smaller size than the types. Plate vi, Fig. 5.

SIPHONOCETUS CLARKIANUS Cope, sp. nov. Plate vi, Fig. 4.

In the collection of the Johns Hopkins University there are portions of mandibular rami of two species of Siphonocetus. The cranium of this genus is unknown, but it is probably similar in character to that of the Cetotherium of Brandt. This genus differs from Balænoptera in having the elements between the supraoccipital and the nasals much elongated, so that there is a sagittal crest of greater or less length, and in the non-union of the dia- and parapophyses into a vertebral canal,* in which it agrees with Eschrichtius of Gray. Some of the rami described belong possibly to species of Balænoptera, and it remains for future discoveries to ascertain which these are.

One of the species above referred to is the *Siphonocetus expansus* Cope.† The other species differs from all of those known to me. In dimensions it exceeds those of any of the species described in this paper, and is only exceeded by the species which I have described (*l. c.*) under the names

* See *American Naturalist*, 1890, p. 611, where these genera are characterized ; but Van Beneden's name, Plesiocetus, is used for Cetotherium, and the latter name for Eschrichtius of Gray.

† *Proceeds. Academy Philada.*, 1869, p. 11.

of *Cetotherium leptocentrum* and *C. cephalus*. It compares more closely in dimensions with the *C. polyporum* from the Chesapeake formation of North Carolina. From the last named, and from the *C. cephalus*, it differs in the robust form of the ramus, resembling in this respect rather such species as *C. palæatlanticum*, *S. priscus* (Leidy), and *S. expansus*.

The fragment representing the *S. clarkianus* is from the part of the ramus anterior to the base of the coronoid process, and is about 350 mm. in length. Both faces are convex, but the external is more strongly so than the internal. The superior part of the latter is, however, not horizontal as in the *S. priscus*, nor is the internal face subhorizontal as in *S. expansus*. The two faces unite above at an obtuse angle, which if perfect, would be nearly right. The inferior edge is on the contrary a ridge which would be acute were it not rounded. The section of the ramus is therefore lenticular, with one side more convex than the other. Posteriorly the external convexity becomes greater, and the internal convexity rises towards the base of the coronoid, leaving a gentle concavity above the inferior border. The external foramina are large, distant, and only a little further below the superior ridge than those of the inferior internal row. The latter are in two series; those of the superior smaller and quite near the superior edge; the others larger and situated lower down, and separated by intervals of about 40 mm. No trace of Meckelian or alveolar grooves.

Measurements.

		MM.
Diameters at distal end...	vertical	95
	transverse	72
Diameters near coronoid..	vertical	114
	transverse	99

The presence of two internal series of foramina distinguishes this species from any of those known to me. The rami are less compressed than those of the *C. pusillum*, while the external position of the external foramina distinguishes it from the *S. priscus* (Leidy). The presence of an acute-angled ridge below distinguishes it strongly from the *C. palæatlanticum*. The species was larger than the *Cetotherium megalophysum* above described, having probably attained a length of forty feet.

I have dedicated it to Prof. William B. Clark, of the Department of Geology and Paleontology of the Johns Hopkins University, to whom I am under obligations for the opportunity of studying most of the material here described. The label attached to the specimen states that it was dredged up near Point-no-Point, Chesapeake Bay, and was presented to Johns Hopkins University by Conrad Miller.

ULIAS MORATUS, gen. et sp. nov. Plate vi, Fig. 1.

Char. gen.—Mandible with the gingivodental canal open throughout most of its length, closed only near its apex. Gingival foramina represented by a few orifices on the alveolar border near the distal extremity.

This form is of much interest as representing in adult life a stage which is transitional in typical Balænidæ. The alveolar groove is continuous with the dental canal, and is permanently open. It is probable then that this genus possessed teeth during a longer period than the existing Balænidæ, and that they were retained in place by a gum so long that the canal could not close as is the case in the latter. The absence of the long series of mental foramina characteristic of the true whales is further evidence to this effect.

Van Beneden, in his *Descriptions des Ossemens Fossiles des Environs d'Anvers*, describes a Balænid under the name of *Balænula balænopsis* which is represented by numerous individuals. I agree with Lydekker (*Catalogue of Fossil Mammalia in the British Museum*, Vol. v) that Van Beneden has not given sufficient reason for separating the species generically from Balæna. There is also considerable diversity between individuals referred to the species. In a small specimen, a narrow alveolar groove is present, but Van Beneden makes no reference to the character in his description. As the groove is closed in large specimens figured, it is possible that M. Van Beneden regarded the character as one of immaturity. This may be the case, as the groove figured by Van Beneden is a very narrow one, and is quite different from the widely gaping channel in the *Ulias moratus*, which is founded on an adult animal.

Char. specif.—This species is founded on a nearly entire right mandibular ramus. The condyle and angle are wanting, as is also a piece from the proximal part of the distal third of the length. This piece was found with the rest of the specimen, but has been, for the present at least, mislaid.

The ramus is moderately curved horizontally, but is not decurved except towards the angle. A slight convexity of the inferior margin exists at the anterior part of the proximal two-fifths of the length. The superior border is occupied with the widely open alveolar groove, which gradually contracts in transverse diameter distally, so as to be closed for the terminal fourth of the length. On this region two or three large foramina issue from it on the middle line above, and the terminal mental foramen issues at the superior extremity of the distal end, a little below the internal ridge on the external side of it. Of the borders of the alveolar groove the internal is much lower than the external on the proximal sixth of the length. The edges are then equal for a short distance, and are acute. The internal then becomes the more elevated, and continues so until its point of union with the external. The internal wall of the groove is at first narrow, and its superior edge from being acute becomes narrowly rounded, but becomes more obtuse distally as the wall becomes thicker. The internal side of the ramus is very little convex. The external side of the ramus is strongly convex in vertical section, hence it is that the external edge of the groove becomes wider as it becomes lower, until at the beginning of the distal third of the length it forms a plane distinct from the convex external face. This external convexity growing rapidly less, the

superior edge becomes proportionally narrower, and at the extremity of the ramus is about as wide as the internal superior ridge. The extremity of the ramus is, in profile, truncated obliquely backwards and downwards to the obtuse angle at which it meets the slight rise in the outline of the inferior margin. The external plane is slightly concave. The internal face exhibits two surfaces, a superior convex portion which widens downwards and backwards, and an inferior wider flat portion separated from the superior by a straight ledge. The inferior border of the ramus is represented by an angle of about 70° for the greater part of the length. Below the region where the alveolar borders are equal the angle is more nearly right owing to the increased convexity of the external face. It is rounded below the coronoid process (which is broken off) and widens towards the angle. It is rounded on the distal third, becoming narrower rapidly towards the distal extremity.

Measurements.

	M.
Length of ramus restored ; on curve	1.900
Length of proximal fragment	.790
Length of distal fragment	.390
Transverse diameter near condyle	.070
Transverse diameter where alveolar borders are equal	.060
Transverse diameter at distal end of long fragment	.057
Vertical diameter where alveolar edges are equal	.073
Vertical diameter at distal end of long fragment	.074
Vertical diameter at proximal end of distal fragment	.079
Transverse diameter at proximal end of distal fragment	.049
Vertical diameter of extremity	.065

Besides the generic characters, the *Ulias moratus* presents various specific differences from the various species of Balænidæ which are known. The flatness of the internal face and the lack of decurvature distinguishes it from several of them ; and the absence of fissure at the distal mental foramen separates it from others. I know of no species which has only one series of foramina and that one on the median line, on the distal fourth, except the present one. The size of the ramus resembles that of the *Cetotherium palæatlanticum* of Leidy, and represents a species of about twenty-five feet in length.

TRETULIAS BUCCATUS, gen. et sp. nov. Plate vi, Fig. 2.

Char. gen.—Dental canal obliterated, and dental groove without osseous roof. Gingival canals and foramina present at one side of the alveolar groove.

The presence of the gingival canals and foramina in this genus, and their absence in Ulias, suggests two alternative phylogenies. First, it is possible that Tretulias is derived from Siphonocetus by failure of the roof of the gingival groove to develop external to the gingival canals by re-

tardation. Or, second, it may have been derived from Ulias or its ancestor, by development of the roof about the gingival canals only, leaving the remainder of the groove open. In the latter case it represents a stage intermediate between Ulias and Cetotherium. But one species is known to me.

Char. specif.—This species is represented by parts of the mandibular rami of two individuals, both preserved in the Museum of Johns Hopkins University of Baltimore. One of these measures 607 mm. in length, and is in fairly good preservation; the other is a shorter fragment, and is considerably worn. They agree in all respects.

The longer fragment is gently curved both inwards and downwards. It is compressed anteriorly, and more depressed posteriorly, so as to be but little deeper than wide. The external face is very convex, more so posteriorly than anteriorly, so that that part of the superior wall which is developed is horizontal, as in the *Siphonocetus priscus* Leidy. The internal face is little convex, and is slightly concave on a line near to and parallel to the inferior border. Generally this angle is obtuse, and is a little more than right; anteriorly, near the extremity it becomes more ridge-like. Posteriorly the section of the ramus represents more than a half-circle, the base being the internal face. The internal basal concavity referred to disappears posteriorly, but its place is occupied by a Meckelian fissure, which extends along the bottom of the groove, disappearing at the end of the terminal two-fifths of the length.

The gingival canals are very oblique, extending horizontally forwards and outwards. The internal foramina issue at spaces of one and two inches, and they are not connected by a superficial groove. The superior (external) series are equally oblique, extending forwards and opening obliquely upwards. Only two of these canals are present on the specimen, and these are on the posterior two-fifths of the length. They are not complete on the external side, and are therefore only grooves. The common canal is open external to them, and separates the superior from the external face of the ramus. It has not the form of the section of the ramus as in other species, but is shallow, and with its long axis oblique to that of the section, and parallel to that of the superior oblique part of the external face. It is shallower than in the *Ulias moratus*, and the species of Cetotherium, and is separated by a wide osseous space from the inferior border. That this form is descended from one with a larger canal is indicated by the fact that the fractures of the ramus display a closed fissure extending from the floor of the canal vertically downwards. The canal is overhung on the inner side by a narrow free border of the superior perforate wall.

Measurements.

		M.
Length of fragment		.607
Diameters posteriorly	vertical	.077
	transverse	.078

Measurements.		M.
Diameters more anteriorly	vertical	.070
	transverse	.065
Diameters near distal extremity	vertical	.073
	transverse	.056

For a length of 200 mm. from the anterior extremity the borders of the gingivodental groove are sufficiently well preserved to demonstrate that it was not closed. The edges posterior to this are more or less worn, so that the roof might be supposed to have been broken away in the absence of other evidence. This is, however, forthcoming, for the internal border is so far preserved near the posterior extremity for a space of 135 mm. as to show that no roof has existed.

Omitting consideration of the generic characters, the following comparisons with other species may be made. In the *Ulias moratus* the gingivodental groove is deeper and narrower, and the inner edge is much narrower. The external face is not so convex. The *Siphonocetus priscus* of Leidy resembles it more nearly in form, but the superior (external) foramina are not so far inwards, and the two canals taken together conform nearly to the outline of the ramus in section, which is far from being the case in the *Tretulias buccatus*. There is no Meckelian groove. In the *Cetotherium palæatlanticum* Leidy, the external face is not so convex, and the internal gingival canals are, according to Leidy, "directed upward and moderately forward." In the *T. buccatus* they are directed forwards horizontally, and very little upwards.

Dr. Leidy has regarded the presence of a Meckelian fissure on the ramus of *C. palæatlanticum* as a specific character, and possibly as generic, as he has given a new generic name to it,* without diagnosis. This fissure I have not observed in any of the rami described by me, except in the case of the present species. It is figured by Van Beneden in some of the Balænidæ of Antwerp, and is stated by him to be common to all the Balænidæ. It is, however, not visible in many recent skeletons, and I am inclined to doubt whether it is normal in adult animals. When the rami of recent Balænidæ dry, they sometimes split along the line of the primitive Meckelian groove, but not always. It remains to be seen whether this is the origin of the fissure in the present species and in the jaw described by Prof. Leidy. The generic name proposed by Prof. Leidy (Protobalæna) is preoccupied by Van Beneden (1867).

CETOTHERIUM PUSILLUM Cope, *Amer. Naturalist*, 1890, p. 616.

Eschrichtius pusillus Cope, *Proceeds. Acad. Nat. Sci.*, Phila., 1868, p. 191; 1869, p. 11.

The fragment of the ramus of this species above referred to is longer than any that have come under my observation, which now number five individuals. Its length is 723 mm., and the diameters at a fracture near

* *Extinct Mamm. Dakota and Nebraska*, 1869, p. 440.

the middle are as follows: vertical, 71 mm.; transverse, 47 mm. It is a little larger than those I have seen hitherto, but agrees with them in every respect. Plate vi, Fig. 6.

CETOTHERIUM MEGALOPHYSUM, sp. nov.

This species is established on a cranium which is complete from the condyles to near the anterior extremity of the nasal bones inclusive. The apices of the zygomatic processes of the squamosal bones and the left auricular bulla are wanting. The presence of the right bulla in the specimen enables comparisons to be made with species in which this part is preserved and where the cranium is wanting. The skull has lain in the water for a considerable time, as numerous barnacles and oysters have attached themselves to it. The matrix has been generally removed from it by the action of the water.

The cranium presents the characters of the genus in the close approximation of the temporal fossæ on the middle line and the elongation of the frontals anterior to this point. Portions of premaxillaries and maxillaries remain at positions much posterior to that of the external nares. The glenoid surface is separated by a sharp angle from the temporal fossa. The sphenoid and presphenoid are keeled on the median line. The vomer is visible between the palatines on the middle line below.

The lateral occipital crests form with a line connecting the exoccipital processes across the foramen magnum, an isosceles triangle with straight sides, each of which is rather shorter than the base-line mentioned. The apex of the supraoccipital is not elevated, and is well produced forwards, so that the length of the cranium from the posterior border of the frontal bone is one and one-half times as long as the depth of the cranium at the same point.

The tympanic bulla has the general form characteristic of species of this genus, but presents specific characters of its own. The part anterior to the posterior boundary of the external process is half as long again as the length posterior to it. The two measurements are equal in the *C. hupschii*, according to Van Beneden. The two ridges of the internal border unite 19 mm. posterior to the anterior extremity, forming a single acute angle. This character is not described by authors as occurring in any other species of this genus. The anterior extremity is squarely truncate, and is semicircular in outline, as the superior side is flat and the inferior convex. In *C. brialmontii*, according to Van Beneden, the bulla is not truncate in front nor is there a single acute edge on the inner side in front; the portions of the bulla anterior and posterior to the internal process are of equal transverse width; in the *C. megalophysum* the anterior portion is considerably narrower than the posterior portion. In *Mesocetus agramii*, according to Van Beneden, there is a single acute internal ridge on the bulla, but it is much longer than in the *Cetotherium megalophysum* and the anterior extremity of the bulla is rounded and not truncate in the former. The bulla in the species now described presents an

angle posteriorly, as viewed from below, instead of the rounded outline seen in several species.

The form of the skull differs from that of several species where that region is known. Thus in the *C. burtinii*, according to Van Beneden, the occipital bone is broadly rounded in outline instead of triangular. In *C. dubium* this region is triangular, but is much more elevated and less produced forwards than in the *C. megalophysum*. It is more elevated than the length from the frontal bone posteriorly, instead of being only two-thirds as high as long. In the *C. morenii*, from Chubut, Patagonia, Lydekker states that the lateral occipital crests are more elevated than the apex of the occipital bone, giving a cordate outline to the posterior profile. This does not occur in any known northern species. The tympanic bulla of this species is also quite different. The occipital region of the *C. hupschii* resembles that of the *C. megalophysum* more nearly than that of any other species as far as known. In the *C. capellinii* Van Ben., according to the descriptions and figures of Capellini, the frontal is more elongate and narrower on the middle line and the tympanic bulla has not the posterior median angle when viewed from below such as exists in the *C. megalophysum*.

Comparison with the species described by Brandt from Russia and Italy, discloses numerous important differences.* The frontoparietal region in the *C. priscum* Br. is materially shorter than in the *megalophysum*. The auricular bullæ of *C. priscum*, *C. meyerii* and *C. klinderii* are gradually acuminate to an acute apex, when viewed from the inner side, and are without the convexity of the lower side and the truncation of the apex characteristic of our species. The bulla of the *C. rathkei* is a little more like that of the Chesapeake form, but it is nevertheless specifically distinct. It is, when viewed from above, broadly and subequally rounded at both extremities, instead of being truncate at the one and angulate at the other. The extremities are of subequal width, while the anterior portion is much narrower in the *C. megalophysum*.

Finally, the bulla of the *C. megalophysum* is of relatively larger size than in any of the species noticed above.

Measurements.

	M.
Length of fragment below	.565
Width of fragment	.515
Width of glenoid region from bulla	.150
Length of glenoid region from bulla (least)	.100
Width of sphenoid between foramina lacera	.105
Length of tympanic bulla below	.100
Width of tympanic bulla in front of external process	.53
Width of tympanic bulla behind external process	.67
Width at exoccipital processes	.400

* *Memoires Acad. Imp. Sciences*, St. Petersburg, 1873, xx, p. 143.

Measurements.	M.
Length anterior to parietals above	.225
Length of occipital from base of foramen magnum to apex (on curve)	.290
Width of occipital condyles and foramen	.140

The mandible of this species is unknown. The size is not far from that of the *Cetotherium pusillum* and *Siphonocetus expansus* of Cope. Should either of these turn out, on the discovery of the skull, to be Cetotheriform, it will become necessary to compare them with the present species. The total length of the animal was about twenty or twenty-five feet.

CETOTHERIUM CRASSANGULUM, sp. nov.

This species is represented by an imperfect skull, to which adhere three cervical vertebræ, the posterior parts of both mandibular rami, parts of the hyoid arch and a humerus. The sagittal part of the skull is crushed and the frontal bones somewhat displaced outwards. Large portions of the nasal bones remain, but the premaxillaries and maxillaries are mostly wanting. By excavating at the proper point the right otic bulla was brought to light. The presence of this structure, together with a considerable part of the mandibular rami, enables me to compare the individual with known species and to determine its specific reference with certainty. The coössification of all the epiphyses shows that the animal is adult.

The species belongs to that group in the genus Cetotherium which is characterized by the presence of a developed angle of the mandible, but where it is short and broadly truncate. The angle is, however, scarcely separated from the condyle, and partakes of the articular surface, apparently much as in the *Balænoptera emarginata* of Owen. It is further distinguished from such species as *C. priscum*, *C. meyerii* and *C. klinderii* by the oval and little-compressed form of the otic bulla, resembling in this part rather the *C. rathkei*. From the *C. megalophysum* the bulla differs by the much smaller dimensions as well as the different form. Thus while the exoccipital width of the skull of the *C. crassangulum* is half as great again as that of the *C. megalophysum*, the length of the bulla is only about three-quarters that of the latter. The bulla of the *C. cephalus* Cope is very different in form from that of either species. It is of the compressed type and is a little smaller than that of the *C. crassangulum*. It is truncate both anteriorly and posteriorly, which is not the case with that of the latter species.

Although the sagittal crest is crushed away, it is evident that it is much less elevated relatively to the width of the skull than in any of the species so far known. This elevation, allowing for the injury, was about equal to that in the *C. megalophysum*, measured from the floor of the foramen magnum. The exoccipital width is one-half greater than that of the latter species. The nareal orifice was about as far in advance of the supraoccipital angle as in the *C. megalophysum* and much further than in any existing whale. The supraorbital portions of the frontal are wanting

and the nasals are spread apart laterally in the matrix. Their lateral portions are produced forwards on each side of the nares for a considerable distance, as vertical plates, in a manner which I have not observed in any other Balænid. The proximal extremity of the bone has the vertical laminate suture usual in the family. The bulla is oval and, viewed from below, the extremities are regularly rounded, the posterior but little wider than the anterior. The inferior side is regularly convex in all directions and the interior edge is flattened as in various other species of Cetotherium. The two lateral internal longitudinal angles come together well externally on the anterior end, thus leaving a very short anterior keeled edge. The fate of the angles is not visible posteriorly, as the bulla is in place, but they do not seem to come together.

There is preserved of the right mandibular ramus .595 m. from the angle forwards, and a corresponding part of the left ramus, measuring .740 m. The condyles and angles of both sides are preserved. The condyle is compressed, and the articular face presents both upwards and backwards. The angle is broadly truncate, its outline a broad parallelogram, which, when placed vertically, presents its lateral upper angle to the condyle, which obliquely truncates the same. The two surfaces are separated by a shallow groove for only a part of this contact; elsewhere they are continuous. The presence of a coronoid process cannot be positively demonstrated, owing to the position of the rami in the matrix. The ramus of the left side displays its characters at the anterior extremity of the fragment. The convexity of the external face, as usual, exceeds that of the internal, but both are rather flat and meet above at an angle which is a little less than a right angle. Foramina are very few in the portion of the ramus preserved. There is a very shallow groove on the internal side of the superior angle, which is pierced by a single small foramen. On the external side a single foramen of still smaller size pierces the external wall anterior to the position of the internal foramen mentioned, and three times as far below the superior angle. The inferior edge of the left ramus is preserved at a position not far posterior to that just described of the right ramus. It presents an obtuse angle, indicating that a more acute angle exists anterior to its position. Posteriorly the right ramus is rounded more broadly below.

The characters of the ramus differ from those of any of the North American species so far known. In *S. clarkianus* and *C. polyporum* the foramina are much more numerous at the corresponding locality. The form of the part is different in the *S. expansus*, *C. pusillum* and *C. cephalus*. In *C. polyporum* and *C. cephalus* the form is more compressed and the superior edge more acute; in the other species named it is less so. There is no meckelian groove as in the *C. palæatlanticum*.

The three cervical vertebræ diminish in anteroposterior and transverse diameters from the first to the third. The diapophyses of the atlas arise opposite to the base of the neural canal and are short. The distal end of each is depressed. No tuberculum atlantis. The axis is slightly concave

transversely below between the bases of the parapophyses. The latter are directed obliquely backwards at an angle of 45° from the articular surface and are vertically expanded at the distal extremity. The parapophyses of the third cervical are as long as those of the second, but are more slender.

The humerus is of the size of that of the *Cetotherium brialmontii*, as represented by Van Beneden, and has the moderately elongate form characteristic of the species of Cetotherium so far as they are known. The tuberosity and crest are broken off, but a portion of the smooth surface which connects the former with the head remains. The distal end is somewhat crushed and the olecranar facet is not as well distinguished from the remainder of the ulnar facet as in most specimens. The humerus is distinguished by two peculiarities. The crest ceases near the middle of the length, and there is a wide and medially deep fossa on the inner side of the shaft immediately beyond the line of the distal end of the crest. Van Beneden figures a somewhat similar fossa in the *Cetotherium hupschii* Van B., but in that species its position is more proximal and it is bounded anteriorly by the distal portion of the crest. The other species of Cetotherium, and those of Balænoptera figured by Van Beneden, do not present this fossa.

Measurements.	M.
Total length of fragment from line of paroccipital	.870
Axial length from occipital condyles to nasal bones, inclusive	.660
Length on occipital bone from foramen magnum to apex of supraoccipital, inclusive (apex restored)	.300
Width of skull at paroccipital processes	.820
Width of skull at exoccipital processes	.620
Width of condyles and foramen	.215
Width of foramen magnum	.070
Length of mandibular ramus to posterior foramen	.680
Depth of condyle and angle posteriorly	.165
Depth of posterior face of angle	.120
Width of posterior face of angle	.090
Vertical diameter of condyle (axial)	.078
Transverse diameter of condyle (axial)	.070
Depth of ramus at last foramen (approximate)	.140
Depth of ramus 130 mm. anterior to condyle	.110
Diameters of otic bulla: anteroposterior	.080
Diameters of otic bulla: transverse at notch	.048
Diameters of otic bulla: transverse at process	.055
Length of epihyal	.120
Diameters of atlas: anteroposterior below	.060
Diameters of atlas: transverse of centrum	.224
Diameters of atlas: transverse do. with diapophyses	.328
Diameters of axis: anteroposterior below	.040
Diameters of axis: transverse in front	.172

Measurements.	M.
Length of parapophysis of second cervical from centrum	.135
Greatest length of humerus	
Anteroposterior diameter of head	.130
Anteroposterior diameter of shaft at middle	.115
Diameters of distal end { transverse (somewhat crushed)	.075
Diameters of distal end { anteroposterior	.170

For the opportunity of describing this specimen I am indebted to the Rev. John T. Goucher, President of the Woman's College of Baltimore, who kindly placed the specimen at my disposal. I am also indebted to Prof. Arthur Bibbins, of the same institution, who first drew my attention to it. The specimen was presented to the Woman's College by Dr. Richard Eppes, of City Point, Va., who obtained it from the Yorktown bed at Tarbay, not far from that place. Dr. Eppes discovered in the year 1854 the specimen which became the type of the *S. priscus* of Leidy, and it is through his hospitality that I have been enabled to visit recently the locality, seven miles below City Point on the James river, where the skull of the *C. crassangulum* was found.

BALÆNOPTERA SURSIPLANA, sp. nov.

Five species of Balænidæ from the Yorktown bed are known from otic bullæ. These are *Balæna mysticetoides* Emmons, *Mesoteras kerrianus* Cope, *Cetotherium cephalus* Cope, *C. megalophysum* Cope, and *C. crassangulum* Cope. The present species will be the sixth. It is established on a bulla from the Yorktown formation of Maryland, and is in excellent preservation, the middle portion of the inferior thin wall being absent.

It is not necessary to compare this species with any of those of the genus Cetotherium. On comparison with the Balænopteræ described by Van Beneden, it is to be observed that they all differ from the present form in the convexity of superior face, where the dense layer or lip has a different chord or face from that of the space which separates it from the internal longitudinal marginal angle. In the *B. sursiplana* there is but one superior plane from the eustachian orifice to the internal edge, which is absolutely flat. In all these species also the dense layer of the lip is reflected on the superior edge of the external thin wall at its anterior end. In the present species this layer is reflected in a very narrow strip underneath the free border, which overhangs it. In all these species also the anterior extremity, as viewed from above or below, is angulate, the angle marking the end of the inner border of the dense layer or lip. In *B. sursiplana* the anterior extremity, viewed in the same way, is truncate. The species which appears to approach nearest is the *B. definita* Owen, which is figured by Lydekker.* This otolite appears to be flatter above than the species described by Van Beneden, although the figure is not clear in this respect. It has the oblique upwards and backwards looking face at the posterior extremity, which is a conspicuous feature of the *B.*

* *Quar. Journ. Geolog. Society*, 1887, Pl. ii, Fig. 3, p. 11.

sursiplana, although it is not so sharply defined by a strong transverse convexity of the superior surface, as in the latter. Nor is there as strong a bevel of the anterior extremity of the superior face when viewed from within, as in *B. definita*. An equally conspicuous difference is to be seen in the form of the inferior wall. According to Lydekker this surface, when the bulla is viewed from within, consists of three planes separated by rounded angles, of which the median is longer than those at the ends. In the *B. sursiplana* this surface is regularly convex from end to end. In size this species is like that of the large Balænopteræ, including the *B. definita*.

Measurements.	MM.
Axial length of bulla	98
Width at posterior extremity of anterior hook at superior border	71
Width at anterior extremity of orifice	35
Width at posterior extremity of orifice	53
Depth at middle (about)	55
Greatest depth of lip	38

BALÆNA AFFINIS Owen, *Brit. Foss. Mamm. and Birds*, 1846; plate opp. p. xlvi. Lydekker, *Catal. Foss. Mamm.* Brit. Mus., v, p. 17, Fig. 7.

Two otic bullæ agree with the figures and descriptions of this species, except in their smaller dimensions. The smallest given by Lydekker is 120 mm. The larger specimen in the Johns Hopkins collection is 105 mm., and the smaller is 95 mm.

All of the material described in this paper, excepting the type specimen of the *Cetotherium crassangulum*, belongs to the Museum of the Johns Hopkins University of Baltimore; and I wish to express my obligations to the authorities of that institution, and especially to Prof. William B. Clark, in charge of the Department of Geology, for the opportunity of studying it.

EXPLANATION OF PLATE.

Diagrammatic sections of the left mandibular rami of species of Balænidæ, one-half natural size.

Fig. 1. *Ulias moratus* Cope.
Fig. 2. *Tretulias buccatus* Cope.
Fig. 3. *Siphonocetus priscus* Leidy.
Fig. 4. *Siphonocetus clarkianus* Cope.
Fig. 5. *Siphonocetus expansus* Cope.
Fig. 6. *Cetotherium pusillum* Cope.
Fig. 7. *Cetotherium polyporum* Cope.

Lettering: *E. G.*, External gingival canal; *I. G.*, Internal gingival canal; *G. G.*, Gingival groove; *D. C.*, Dental canal.

APPENDIX.

MESOCETUS SIPHUNCULUS, sp. nov.

The genus Mesocetus was established by Van Beneden* for Mystacoceti in which the posterior part of the mandibular ramus approaches in its characters that of the Odontoceti. That is, the condyle is situated at the middle of the vertically compressed posterior border, and is more or less expanded transversely. It is thus below the superior part of the posterior extremity of the ramus, instead of constituting that part, as it does in the whalebone whales generally. That structure is naturally adapted to a more anterior direction of the glenoid cavity, as is shown by Van Beneden. The only known species of the genus is the *M. agrami* Van Ben. from the Neocene beds of Agram in Croatia, Austria. It is of much interest that a second species is now determined to have existed in the Neocene formation of Virginia.

Van Beneden does not appear to have seen much if any of the mandibular ramus anterior to the condyle. I have a ramus nearly entire, and smaller parts of three others, and can thus locate the genus Mesocetus in relation to those already defined. In the species now to be described, the ramus has no large dental canal, but it is almost entirely filled with spongy bone of moderate coarseness. The gingival canals unite into a single tube which is not larger than one of the external gingival canals, and which runs about opposite to them or a little distance below the superior edge. In this disposition of the canals Mesocetus differs from any of the genera of Mystacoceti referred to in the preceding pages.

Char. specif.—Founded primarily on a nearly complete right mandibular ramus, and represented by the anterior part of a second ramus of a smaller individual. The distal part of the ramus of a third individual resembles the last one, but differs in some respects from it, so that the reference cannot now be made. These specimens I saw taken from the same locality and bed, and I took the type specimen myself piecemeal from the deposit. The latter is a wet phosphatic marl, and it was impossible to remove the specimen without damage. It has been reconstructed under my eye by my assistant so as to be in good condition.

The ramus exhibits little curvature in any direction. It is strongly compressed, and although the external face is more convex than the internal, the convexity is not great. The superior border is throughout thicker transversely than the inferior. Both are obtusely rounded anteriorly, but both become more compressed posteriorly. The inferior border becomes rather acute posteriorly. The usual ledge is present on the internal or symphyseal side of the distal extremity. The representative of the anterior part of the dental canal issues posterior to the distal border and a little below the superior border; the external border of the

* *Memoires de l'Academie royale des Sciences de Lettres et des Beaux Arts de Belgique* 1882, Vol. xlv.

foramen is notched, and a shallow groove rises from its superior angle and returns posteriorly as a shallow groove of the superior middle line. This groove disappears in a small median foramen, the first of the series of small foramina of the inner side of the superior border. The foramina of this series are small and represent the exits of narrow canals which run horizontally inwards so close together that a fractured surface passing through them resembles a sutural surface with oblique grooves. From a median superior position they assume an internal lateral position, and disappear at about the posterior third of the ramus. The inner face of the ramus above these foramina becomes slightly concave. The large external foramina are rather numerous and are situated at intervals of about 45 mm. They are situated posteriorly about as far below the superior edge as those of the internal series, and they retain that position anteriorly, not rising to a higher position, as is the case with those of the internal series. Posteriorly the internal face becomes slightly concave next the inferior border. The posterior part of the ramus is strongly concave on the inner side, and is thin walled. The base of the coronoid process indicates that it is flared outwards.

The condyle is a vertical oval tapering more gradually upwards than downwards. The superior border of the ramus is thin and curves strongly inwards, quite as Van Beneden has restored the corresponding part in the *M. agrami*. This condyle differs from that of the *M. agrami* in having a less transverse extent, especially on the inner side, and in lacking the transverse ridges and grooves described and figured by Van Beneden (Pl. ii, Fig. 10). This is the only part of the two animals which is present in both specimens; and the comparison indicates that the species are different.

I have probable vertebræ of this species, but I cannot yet associate them with certainty. A first dorsal was found in immediate contact with the posterior part of the ramus. This resembles considerably the corresponding vertebra of the *M. agrami* described by Van Beneden. It has lost its epiphyses, but if these were added, its anteroposterior diameter would be less than that of the latter, and there is not nearly so conspicuous a facet for the head of the first rib. This is very indistinct in my vertebra. A perfect humerus was also found near the position from which the second and third rami were dug out. Until I know the proper relation of this humerus I will only describe it so far as to say that it has the proportions of that of Cetotherium, but that the tuberosity is not produced beyond the head, and the olecranar facet is not distinguished by an angle from the remainder of the ulnar facet.

Measurements.		MM.
Total length (subject to some correction on account of a fracture)		1290
Diameters at mental foramen	vertical	97
	transverse	28
Diameters at 500 mm. from distal end	vertical	90
	transverse	48
Diameters of condyle	vertical	120
	transverse	61
Diameters of centrum first dorsal vert.	vertical	57
	transverse	85
	anteroposterior	31
Expanse of diapophyses		170

From the Miocene marl of the Pamunkey river, Virginia.

Stated Meeting, March 1, 1895.

Treasurer, Mr. PRICE, in the Chair.

Present, 15 members.

Dr. Richard A. Cleemann, a lately-elected member, was presented to the Chair.

Correspondence was submitted as follows:

Letters accepting membership from Dr. Richard A. Cleemann, Philadelphia; Mr. Richard S. Hunter, Philadelphia.

Letters of acknowledgment (143, 146) were received from the Franklin Institute, Engineers' Club, Wagner Free Institute of Science, Free Library of Philadelphia, Historical Society of Pennsylvania, College of Physicians, Numismatic and Antiquarian Society, Mercantile Library, Library Company of Philadelphia, Hon. James T. Mitchell, Hon. Henry Reed, Profs. John Ashhurst, Jr., F. X. Dercum, Henry D. Gregory, H. V. Hilprecht, J. P. Lesley, J. A. Ryder, Drs. John H. Brinton, W. W. Keen, F. W. Lewis, Morris Longstreth, Charles A. Oliver, C. N. Peirce, James W. Robins, W. S. W. Ruschenberger, Henry Clay Trumbull, Messrs. R. L. Ashhurst, Henry C. Baird, Cadwalader Biddle, Lorin Blodget, Charles

Bullock, S. Castner, Jr., C. H. Clark, Samuel Dickson, Patterson DuBois, Philip C. Garrett, George Harding, William W. Jefferis, Benj. Smith Lyman, Franklin Platt, Frederick Prime, Theo. D. Rand, Julius F. Sachse, W. P. Tatham, Louis Vossion, Joseph M. Wilson, Ellis Yarnall, Philadelphia; Mr. Philip P. Sharples, West Chester, Pa.

A letter from Lorin Blodget, dated February 23, 1895, was read, in reference to a large collection of reports on Applied Electric Force, which he had obtained.

Accessions to the Library were reported from the K. Nordiske Oldskrift-Selskab, Copenhagen, Denmark; Académie R. de Belgique, Bruxelles; École des Mines, Secréteriat de S. A. S. le Prince Albert I^{er} de Monaco, Paris, France; U. S. Geological Survey, U. S. Department of Agriculture, Washington, D. C.; Artillery School, Fort Monroe, Va.

Photographs for the Society's album were received from Prof. James M. Hart, Ithaca, N. Y.; Mr. Robert N. Toppan, Cambridge, Mass.

A paper by Dr. F. Boas on "Salishan Texts" was presented by Dr. Brinton, who gave a brief synopsis of it.

Mr. F. Prime made some remarks on the relation of gold and silver, showing the output of those metals through a series of years, and the relative values of the two at different periods of recent history.

An extended discussion took place on Mr. Prime's communication, partaken in by Dr. Morris, Dr. Greene, Dr. Horn, Prof. Snyder, Mr. Rand and others. Opinions were expressed on the bearing of the facts stated, on the merits of a bimetallic standard of currency, etc.

Dr. Greene spoke of the new element akin to nitrogen, which has lately been discovered, called *Argon*.

The death of Gen. William F. Raynolds, U. S. A., Detroit, Mich., was announced.

And the Society was adjourned by the presiding member.

Stated Meeting, March 15, 1895.

Treasurer, Mr. PRICE, in the Chair.

Mr. Charlemagne Tower, Jr., a newly-elected member, was presented to the Chair, and took his seat.

Correspondence was submitted as follows:

Acknowledgments of election to membership were received from:

Dr. Herman Snellen, Jr., Utrecht, Netherlands.

Prof. William W. Goodwin, Cambridge, Mass.

Prof. Alpheus Hyatt, Cambridge, Mass.

Mr. Charles C. Harrison, Philadelphia.

Mr. Charlemagne Tower, Jr., Philadelphia.

Letters of acknowledgment were received from the Royal Society of Victoria, Melbourne (142, 144); Royal Society of New South Wales, Sydney (142, 144); Societas pro Fauna Flora Fennica, Helsingfors, Finland (145); Physico-Mathematical Society, Kasan, Russia (144, 145); K. K. Geologische Reichsanstalt, Vienna, Austria (145); Verein f. Erdkunde, Dresden, Saxony (145); Verein der Freunde der Naturgeschichte, Mecklenburg, Germany (142, 144, 145); R. Istituto Lombardo di Scienze e Lettere, Milan, Italy (144); Sir Henry W. Acland, Oxford, Eng. (145); Mr. F. Prime, Philadelphia (145); University of Wisconsin, Madison (136–141); Museo Nacional, Buenos Aires, Argentine Republic (142, 144); Société Scientifique du Chili, Santiago (145).

Letters of acknowledgment (143 and 146) were received from the Nova Scotian Institute of Natural Science, Halifax; Mr. Horatio Hale, Clinton, Ontaria; Geological Survey, Ottawa, Canada; Laval University, Hon. J. M. Le Moine, Quebec, Canada; Canadian Institute, Toronto; Bowdoin College Library, Brunswick, Me.; Society of Natural History, Maine Historical Society, Portland, Me.; Prof. C. E. Hitchcock, Hanover, N. H.; Vermont Historical Society, Montpelier; Amherst College Library, Amherst, Mass.; Athenæum, Boston Society of Natural History, Massachusetts Institute of

Technology, Massachusetts Historical Society, American Academy of Arts and Sciences, State Library of Massachusetts, Mr. Stephen P. Sharples, Boston, Mass.; Museum of Comparative Zoölogy, Profs. George Lincoln Goodale, J. D. Whitney, Dr. Justin Winsor, Mr. Robert N. Toppan, Cambridge, Mass.; Free Public Library, New Bedford, Mass.; Essex Institute, Salem, Mass.; Prof. Elihu Thomson, Swampscott, Mass.; American Antiquarian Society, Worcester, Mass.; Providence Franklin Society, R. I. Historical Society, Brown University, Dr. A. S. Packard, Providence, R. I.; Mr. George F. Dunning, Farmington, Conn.; Connecticut Historical Society, Hartford; Connecticut Agricultural Experiment Station, Yale University, Profs. O. C. Marsh, H. A. Newton, New Haven, Conn.; New York State Library, Prof. James Hall, Albany, N. Y.; Buffalo Library. Society of Natural Sciences, Buffalo, N. Y.; Prof. Edward North, Clinton, N. Y.; Profs. T. F. Crane, J. M. Hart, W. T. Hewett, Ithaca, N. Y.; American Institute of Electrical Engineers, Columbia College; American Museum of Natural History, New York Academy of Medicine, Historical Society, New York Hospital, Academy of Science, Brevet Brigadier-General H. L. Abbot, Captain R. S. Hayes, Profs. Joel A. Allen, Isaac H. Hall, J. J. Stevenson, Dr. Daniel Draper, New York, N. Y.; Geological Society of America, Rochester, N. Y.; Prof. W. Le Conte Stevens, Troy, N. Y.; Oneida Historical Society, Utica, N. Y.; United States Military Academy, West Point, N. Y.; Free Public Library, Jersey City, N. J.; Prof. Robert W. Rogers, Madison, N. J.; Profs. C. F. Brackett, A. B. Fine, W. Henry Green, Princeton, N. J.; Dr. Charles B. Dudley, Altoona, Pa.; Dr. Robert H. Alison, Ardmore, Pa.; Dr. Charles F. Himes, Carlisle, Pa.; Prof. M. H. Boyè, Coopersburg, Pa.; Hon. Eckley B. Coxe, Drifton, Pa.; American Academy of Medicine, Dr. Traill Green, Prof. J. W. Moore, Rev. Thomas Conrad Porter, Easton, Pa.; State Library of Pennsylvania, Hon. Robert E. Pattison, Mr. Andrew S. McCreath, Harrisburg, Pa.; Haverford College, Profs. Lyman B. Hall, Allen C. Thomas, Haverford, Pa.; Mr. John Fulton, Johnstown, Pa.; Academy of

Natural Sciences, Hon. Henry Reed, Profs. Andrew A. Blair, James MacAlister, William Pepper, Samuel P. Sadtler, Albert H. Smyth, Dr. D. G. Brinton, Messrs. R. Meade Bache, Richard S. Hunter, E. V. d'Invilliers, Samuel Wagner, Mrs. Helen Abbott Michael, Philadelphia; Mr. Heber S. Thompson, Pottsville, Pa.; Rev. F. A. Muhlenberg, Reading, Pa.; Dr. W. H. Appleton, Swarthmore, Pa.; Dr. John Curwen, Warren, Pa.; Philosophical Society, Hon. William Butler, West Chester, Pa.; Wyoming Historical and Geological Society, Wilkesbarre, Pa.; Agricultural Experiment Station Newark, Del.

Accessions to the Library were reported from the Government Observatory, Madras, India; R. Geographical Society, St. Petersburg, Russia; État Indepéndant du Congo, Bruxelles, Belgique; K. K. Zoologisch-botanisch Gesellschaft, Vienna, Austria; R. Accademia d. Scienze, Turin, Italy; R. Academia de Ciencias y Artes, Barcelona, Spain; Society of Antiquaries, R. Meterological Society, London, Eng.; R. Geological Society of Cornwall, Penzance, Eng.; Theological Seminary, Andover, Mass.; Essex Institute, Salem, Mass.; Prof. O. C. Marsh, New Haven, Conn.; Oneida Historical Society, Utica, N. Y.; American Academy of Medicine, Easton, Pa.; Free Public Library, Jersey City, N. J.; Mercantile Library, Academy of Natural Sciences, College of Physicians, University of Pennsylvania, Indians' Rights Association, Mr. Henry Carey Baird, Philadelphia; United States Naval Institute, Annapolis, Md.; Enoch Pratt Free Library, Editor of the *Journal of Philology*, Baltimore, Md.; Historical Society of Southern California, Los Angeles; Mercantile Library Association, St. Louis, Mo.; Society of Natural History, Cincinnati, O.; Mr. William R. Head, Chicago, Ill.; State University of Iowa, State Historical Society, Iowa City, Ia.; University of Wisconsin, Madison; Prof. J. L. Campbell, Crawfordsville, Ind.; University of Kansas, Lawrence; Colorado Scientific Society, Denver; Observatoire Météorologique Central, Observatorio Astronomico Nacional de Tacubaya, Direccion Général de Estadistica, Mexico, Mexico; Sociedad Cientifica Argentina, Buenos

Aires; Agricultural Experiment Stations, Amherst, Mass., College Park, Md., Experiment, Ga., Fort Collins, Colo., Lincoln, Neb., Corvallis, Oregon, Lawrence, Wyo.

The following deaths were announced:

M. Victor Duruy, Paris, France.

Sig. Giovanni Battista Rossi, Rome, Italy.

A portrait of the late Dr. John Le Conte was presented on behalf of the donor, Mrs. Le Conte, by Dr. Horn, who referred to the services to science rendered by Dr. Le Conte. Dr. J. C. Morris followed with a tribute to the memory of Dr. Le Conte's personal and official career, and moved a vote of thanks to Mrs. Le Conte for the gift of the portrait. Carried.

Mr. Benjamin Smith Lyman read a paper entitled "Folds and Faults in Pennsylvania Anthracite Beds."

On account of the large number of engravings required by the paper, on motion of Dr. Brinton it was referred to a special committee of three, to be appointed by the Chair.

The following paper was read by title by Prof. E. D. Cope: "The Structure and Origin of the Zygomatic Arch in the Mammalia," by Daniel Slade, Mus. Comp. Zoölogy.

Dr. Cope presented a paper, for the Proceedings, illustrated by a number of specimens, on some "Extinct Cetacea."

Pending nominations 1306, 1307, 1308, 1309 were read.

And the Society was adjourned by the presiding member.

Stated Meeting, April 5, 1895.

President, Mr. FRALEY, in the Chair.

Mr. Henry C. Mercer, a newly-elected member, was presented to the Chair and took his seat.

Correspondence was submitted as follows:

Acknowledgments of election to membership were received from:

R. T. Glazebrook, F.R.S., Cambridge, Eng.

C. A. M. Fennell, Litt.D., Cambridge, Eng.

Prince Roland Bonaparte, Paris, France.
E. A. Wallis Budge, Litt. D., London, Eng.
Sir George Grove, C.B , London, Eng.
William Huggins, D.C.L., London, Eng.
Rev. James Legge, LL.D., Oxford, Eng.
Rev. Isaac Taylor, LL.D., York, Eng.
Prof. W. Wundt, Leipzig, Germany.
Dr. Ernst Curtius, Berlin, Prussia.
Mr. Joseph Wilcox, Philadelphia.
Mr. Henry C. Mercer, Doylestown, Pa.
Prof. Gabriel de Mortellet, St. Germain-en-Laye, France.

Letters of envoy were received from the Government Astronomer, Madras, India; K. K. Astronomisch-meteorologische Observatorium, Triest, Austria; Université Royale, Lund, Sweden; Bureau des Longitudes, Paris, France; R. Academia de Ciencias y Artes, Barcelona, Spain; Meteorological Office, British Association for the Advancement of Science, London, Eng.; Royal Irish Academy, Dublin; Oneida Historical Society, Utica, N. Y.; Dirección General de Estadistica de la República Mexicana, Mexico.

Letters of acknowledgment were received from the Institut Egyptien, Cairo (142, 144, 145); R. Zoölogical Society, Amsterdam, Netherlands (145); Royal Library, The Hague, Holland (145); Colonial Museum, Musée Teyler, Harlem, Holland (145); Friesch Genootschap van Geschied-Oudheid en Taalkunde, Leewarden, Holland (145); Académie R. des Sciences, des Lettres, etc., Bruxelles, Belgique (144, 145); Prof. Peter R. v. Tunner, Leoben, Styria (144); Naturforschende Gesellschaft, Bamberg, Bavaria (145); Naturhistorische Gesellschaft, Hannover, Prussia (142, 144, 145); Prof. Carl Vogt, Geneva, Switzerland (145); Accademia R. delle Scienze, Torino, Italia (144); Philosophical Society, Cambridge, Eng. (145); Public Library, Boston, Mass. (143, 146); Profs. William W. Goodwin, Alpheus Hyatt, C. R. Lanman, Cambridge, Mass. (143); Rev. Edward E. Hale, Roxbury, Mass. (146); Marine Biological Laboratory, Woods Holl, Mass. (143, 146); R. I. Agricultural Experiment Station, Kingston (143, 146);

Prof. Levi W. Russell, Providence, R.I. (143); *American Journal of Science* (143), Prof. H. A. Newton, New Haven, Conn. (142, 144, 145); Prof. B. G. Wilder, Ithaca, N. Y. (143, 146); N. Y. Academy of Medicine (141, 145), Editor of the *Popular Science Monthly* (143), Hon. Charles P. Daly (143, 146), Prof. Henry F. Osborn, New York, N.Y. (143); Oneida Historical Society, General Charles W. Darling, Utica, N.Y. (143); Profs. William Libbey, Jr. (143), C. A. Young, Princeton, N. J. (143, 146); Dr. E. D. Warfield, Easton, Pa. (143); Mr. S. M. Sener, Lancaster, Pa. (143); Profs. Henry F. Bitner, H. Justin Roddy, Millersville, Pa. (143); Profs. Andrew A. Blair (142, 144, 145), J. Solis Cohen (143), Drs. Persifor Frazer (146), John Marshall (146), D. K. Tuttle (143), Charles Stewart Wurts, (143, 146), Messrs. Arthur Biddle (143), Arthur E. Brown (143, 146), Robert Patterson Field (143, 146), Joseph C. Fraley (143), William A. Ingham (143, 146), Thomas Meehan (143), Robert Patterson (143), L. A. Scott (143, 146), Joseph Wilcox Philadelphia (143–146); Patent Office Library Washington, D. C. (143); Captain William N. Casey, U.S A., Norfolk, Va. (143); Academy of Science, St. Louis, Mo. (146); College of Agriculture and Mechanic Arts, Mesilla Park, N. M. (143); Museo Nacional (144), Société Scientifique du Chili, Santiago de Chile (142).

Letters of acknowledgment (143 and 146) were received from the Smithsonian Institution (6 cases, 446 packages), Anthropological Society, Bureau of Ethnology, Library Surgeon-General's Office, U. S. Naval Observatory, U. S. Coast and Geodetic Survey, U. S. Geological Survey, U. S. Department of Agriculture, Rt. Rev. John J. Keane, Profs. S. F. Emmons, C. V. Riley, Charles A. Schott, Dr. W. J. Hoffman, Mr. Lester F. Ward, Washington, D.C.; Mr. Jedediah Hotchkiss, Staunton, Va.; University of Virginia, Va.; Prof. J. W. Mallet, University of Virginia, Va.; Hon. Lyon G. Tyler, Williamsburg, Va.; West Virginia University, Morgantown; Agricultural Experiment Station, Raleigh, N.C.; Georgia Historical Society, Savannah; Agricultural Experiment Station, Knoxville, Tenn.; Experiment Station Library, Auburn, Ala.;

University of Alabama, University P.O.; University of California, Berkeley; Lick Observatory, Mt. Hamilton, Cal.; California Academy of Sciences, San Francisco; Texas Academy of Science, Austin; State Agricultural College, Michigan; Geological Survey of Missouri, Jefferson City; Prof. E. W. Claypole, Akron, O.; Editors of the *Journal of Comparative Neurology*, Granville, O.; Society of Natural History, Cincinnati Observatory, Hon. J. D. Cox, Cincinnati, O.; Oberlin College, Oberlin, O.; Athenæum Library, Columbia, Tenn; Academy of Sciences, St. Louis, Mo.; Prof. J. L. Campbell, Crawfordsville, Ind.; Indiana Engineers' Society, Remington; Field Columbian Museum, Newberry Library, Chicago, Ill.; Iowa Experiment Station, Ames; Iowa Masonic Library, Cedar Rapids; Academy of Natural Sciences, Davenport, Ia.; State Historical Society, Iowa City, Ia.; American Archæological and Asiatic Association, Nevada, Ia.; State Historical Society of Wisconsin, Academy of Sciences, Arts and Letters, Madison, Wis.; Agricultural Experiment Station, Manhattan, Kans.; Kansas Academy of Science, Topeka; Agricultural Experiment Station, Corvallis, Oregon; Colorado Scientific Society, Denver; Agricultural Experiment Station, Fort Collins, Col.; Nebraska State Historical Society, Lincoln; Academy of Science, Tacoma, Wash.; University of Wyoming, Laramie; Dakota Agricultural College, Brookings.

Accessions to the Library were reported from the Naturforscher-Verein, Riga, Russia; K. D. Geografiske Selskab, Copenhagen; Université Royale, Lund, Sweden; Société Royale de Geographie, Antwerp, Belgium; Hungarian Nat. Museum, Budapest; Académie des Sciences, Cracow, Austria; Osservatorio Astronomico-Meteorologico, Trieste, Austria; K. K. Naturhistorische Hofmuseum, Vienna, Austria; Akademie der Wissenschaften, Verein zur Beförderung des Gartenbaues, Berlin, Prussia; K. Sächsische Gesellschaft der Wissenschaften, Leipzig; Naturhistorische Verein der Preussischen Rheinlande, etc, Bonn, Prussia; Württembergische Kommission für Landesgeschichte, Stuttgart; Prof. M. E. Renevier, Lausanne, Switzerland; R. Academia de Ciencias, R. Acade-

mia de la Historia, Madrid, Spain; Muséum d'Histoire Naturelle, Paris, France; Mr. James L. Bowes, Liverpool, Eng.; British Association for the Advancement of Science, London, Eng.; Geographical Society, Manchester, Eng.; R. I. Historical Society, Providence; Academy of Sciences, Historical Society, New York, N.Y.; Rev. Joseph H. Dulles, Princeton, N.J.; Messrs. Henry Phillips, Jr., Julius F. Sachse, Philadelphia; Light House Board, Smithsonian Institution, Mr. F. W. Hodge, Washington, D.C.; Editors of the *Journal of Comparative Neurology*, Granville, O.; Agricultural Experiment Stations, Durham, N. H., Lexington, Ky., Ames, Ia.; Sociedad Central de Profesores del Estado, Puebla, Mex.; Observatorio Meteorologico Central, Xalapa, Mex.; Institute of Jamaica, Kingston; Direccion Général de Estadistica, Guatemala, C. A.

A photograph for the Society's Album was received from Prof. Peter R. v. Tunner, Leoben, Austria.

The following deaths were announced:

Prof. Henry Coppée, Bethlehem, Pa. Born October 13, 1821; died March 21, 1895.

Hon. Richard Vaux, Philadelphia. Born December 19, 1816; died March 22, 1895.

Dr. W. S. W. Ruschenberger, Philadelphia. Born September 4, 1807; died March 24, 1895.

Prof. John A. Ryder, Philadelphia. Born 1852; died March 26, 1895.

Prof. James E. Oliver, Ithaca, N. Y. Born July 27, 1829; died March 27, 1895.

Dr. Brinton moved that the President, at his leisure, appoint members to prepare suitable obituary notices of the deceased.

Prof. Cope, by consent, paid a tribute to the scientific standing of the late Prof. Ryder, and the exceptional value of his investigation into ontogeny.

The President appointed Prof. Cope to prepare the obituary notice of the late Prof. Ryder. Prof. Cope accepted the appointment.

Prof. Cope read his paper on "Crania of Fossil Whalebone Whales," as announced.

Mr. Du Bois read a paper on the "Priority of the Manufacture of Extremely Thin Gold Leaf by Electrical Processes."

Remarks, corroborative of the tenor of the paper, were made by Mr. Joseph Fraley.

The Committee upon Mr. Lyman's Paper reported and was continued.

Pending nominations 1306, 1307, 1308, 1309, and new nominations 1310, 1311, 1312, were read.

And the Society was adjourned by the President.

Stated Meeting, April 19, 1895.

President, Mr. FRALEY, in the Chair.

Mr. Richard S. Hunter, a newly elected member, was presented to the Chair, and took his seat.

Correspondence was submitted as follows:

A circular letter from the Geographical Society of Toulouse, France, requesting that the Society examine into the method of applying the Decimal System parallel and simultaneously to the measurement of angles and time.

A letter was read from Philip P. Calvert, Secretary of the Ryder Memorial Meeting, requesting the Society to appoint a representative to the Committee of Publication of that meeting.

On motion, the President was requested to make the appointment.

Prof. Cope was subsequently appointed.

Letters were read from Mr. Dalton Dorr, Superintendent of the Pennsylvania Museum of Industrial Art, and Mr. F. D. Langenheim, Curator of the Numismatic and Antiquarian Society, requesting the Society to take the receipt of the former institution for the Society's coins and medals deposited

therein, and return the receipt held by the latter institution. A list of the coins and medals belonging to the Society accompanied the letters.

Dr. Brinton moved that the letters of Messrs. Dorr and Langenheim, together with the list of coins and medals, be referred to the Curators, with instructions to take a receipt for them from the Pennsylvania Museum of Industrial Art as a deposit in that institution.

After some discussion the motion was carried.

Letters of envoy were received from the Academie des Sciences, Cracow, Austria; Naturforschende Gesellschaft des Osterlandes, Altenburg i. S. A., Germany; K. Sächsische Gesellschaft der Wissenschaften, Leipzig; Société de Géographie, Berne, Switzerland; Bath and West and Southern Counties Society, Bath, England; Meteorological Council, London, England; Iowa Geological Survey, Des Moines.

Letters of acknowledgment were received from Dr. Otto Donner, Helsingfors, Finland (145); Russia Tashkent Observatory (144, 145); Maatschappij der Nederlandsche Letterkunde, Leiden, Z. Holland (145); Société R. de Géographie, Antwerp, Belgium (145); Naturforschende Gesellschaft, Schweiz. Naturforschende Gesellschaft, Berne, Switzerland (145); Anthropologische Gesellschaft, Vienna, Austria (145); Anthropologische Gesellschaft, Berlin, Prussia (145); Naturhistorische Verein, Bonn, Prussia (142, 144, 145); K. Sächs. Alterthumsverein, Dresden (142, 144); Naturhistorische Museum, Hamburg, Germany (*Trans.*, xvii, 3); K. Sächs. Gesellschaft der Wissenschaften, Leipzig (142, 144, 145); Naturwissenschaftliche Verein, Osnabrück, Germany (144, 145); Literary and Philosophical Society, Liverpool, England (145); Prof. W. W. Goodwin, Cambridge, Mass. (144, 145, 146); American Mathematical Society (143), Mr. James Douglas, New York, N. Y. (143, 146); Vassar Brothers' Institute, Poughkeepsie, N. Y. (143, 146); Academy of Science, Rochester, N. Y., (143, 146); Dr. H. Hartshorne, Germantown, Pa. (143); Mr. Joseph Wilcox, Philadelphia (143–146); Prof. John F. Carll, Pleasantville, Pa. (143, 146); U. S. Naval

Institute, Annapolis, Md. (143, 146); Mr. T. L. Patterson, Cumberland, Md. (143, 146); Maryland Institute, Enoch Pratt Free Library, Peabody Institute, Prof. J. E. Humphrey, Baltimore, Md. (143, 146); Smithsonian Institution, U. S. National Museum (143, 146), Dr. John S. Billings, Washington, D. C. (146); Agricultural Experiment Station, Morgantown, W. Va. (143); Ohio State Archæological and Historical Society, Columbus (143–146); State Geological Department, Frankfort, Ky. (143, 146); Agricultural Experiment Station, Knoxville, Tenn. (140, 144, 145); Prof. Joseph Le Conte, Berkeley, Cal. (143, 146); Historical Society of Southern California, Los Angeles (143, 146); California Historical Society (143, 145, 146), California State Mining Bureau (143), Prof. George Davidson, San Francisco, Cal. (143, 146); Prof. J. C. Branner, Stanford University, Cal. (143, 146); University of Wisconsin, Madison (136–141, 143–146); Prof. G. W. Hough, Evanston, Ill. (143); Kansas State Historical Society, Topeka (143, 146); Experiment Station Library, Lincoln, Neb. (143, 146); North Dakota Agricultural College, Fargo (143, 146); Bishop Cr. Carrillo, Merida, Yucatan (143, 146); Dr. Antonio Peñafiel, Mexico, Mex. (143, 146); Observatorio Astronómico Nacional Mexicano, Tacubaya (143, 146).

Accessions to the Library were reported from the Société Entomologique de Belgique, Bruxelles; Naturforschende Gesellschaft des Osterlandes, Altenburg i. S. A., Germany; Gesellschaft für Anthropologie, Ethnologie, etc., Berlin, Prussia; K. Gesellschaft der Wissenschaften, Göttingen, Prussia; K. Sächsische Gesellschaft der Wissenschaften, Leipzig; Società R. di Napoli, Napoli, Italia; Bath and West and Southern Counties Society, Bath, England; Meteorological Council, London, England; Natural History and Philosophical Society, Belfast, Ireland; Public Library, Salem, Mass.; Agricultural Experiment Station, New Haven, Conn.; University of the State of New York, Albany; Enoch Pratt Free Library, Baltimore, Md.; U. S. Coast and Geodetic Survey, Lighthouse Board, Washington, D. C.; Denison University, Granville, O.; Cincinnati Observatory, Cincinnati, O.; Iowa Geo-

logical Survey, Des Moines; Kansas State Agricultural College, Manhattan; Observatorio-Magnetico Central, Mexico, Mex.

The death of Prof. James D. Dana, New Haven, Conn. (born Feb. 12, 1813, died April 14, 1895), was announced.

The President announced that he had requested Mr. C. Stuart Patterson, Prof. E. D. Cope, Dr. D. G. Brinton and Mr. J. G. Rosengarten to prepare the obituary notices of Mr. Vaux, Prof. Ryder, Dr. Ruschenberger and Prof. Coppée respectively, and that they had accepted the appointments.

An obituary notice of the late Mr. Thomas H. Dudley by Mr. W. John Potts was submitted and read by title.

Dr. D. G. Brinton read a paper on "The Protohistoric Ethnography of Asia Minor." The paper was discussed by Prof. H. V. Hilprecht and others.

Pending nominations Nos. 1306, 1307, 1308, 1309, 1310, 1311, 1312, and new nominations Nos. 1313, 1314, 1315, 1316 were read.

The nominations for non-resident members, recommended by Council and not acted on, were placed in nomination.

A report was read from the Special Committee in reference to the plates attached to Mr. Lyman's paper. As the report was not definitive, on motion the Committee was continued and requested to prepare a final report at the next meeting. On further motion, as Mr. Henry Phillips, Jr., a member of the Committee, was ill, Mr. J. Sergeant Price was appointed to act in his place.

And the Society was adjourned by the President.

Stated Meeting, May 3, 1895.

President, Mr. FRALEY, in the Chair.

Correspondence was submitted as follows:

Letters from Sarah J. Farmer, Eliot, Me., and Mr. James Lindsay, Kilmarnock, Scotland, the latter accompanying a book presented by him to the Society.

Letters of envoy were received from the Geological Survey of India, Calcutta; Musée Teyler, Haarlem, Holland; K. Geologische Landesanstalt und Bergakademie, Berlin, Prussia; K. Sächsische Gesellschaft der Wissenschaften, Leipzig; Meteorological Observatory, New York, N. Y.; Historical Society of Southern California, Los Angeles.

Letters of acknowledgment were received from the Societatea Geografica Română, Bucharest (144); Univērsitets-Bibliotheket, Christiana, Norway (145); Prof. Japetus Steenstrup, Copenhagen, Denmark (145); Naturwissenschaftliche Verein, Frankfurt a. O. (145); K. Gesellschaft der Wissenschaften, Göttingen, Prussia (*Trans.*, xiii, 3); Prof. G. Maspero, Paris, France (145); South African Philosophical Society, Cape Town (136–141); Hon. E. J. Phelps, New Haven, Conn. (119, 143); N. J. Historical Society, Newark (143, 146); Mr. Henry C. Mercer, Doylestown, Pa. (144, 145, 146); Mr. Jacob B. Eckfeldt, (143, 146), Dr. Charles Schäffer, Philadelphia (143, 144, 146); Maryland Historical Society, Baltimore (143).

Accessions to the Library were reported from the Naturwissenschaftliche Verein des Reg. Bez., Frankfurt a. O.; Musée Teyler, Haarlem, Holland; Friesch Genootschap van Geschied, Oudheid, en Taalkunde, Leeuwarden, Netherlands; R. Museum van Oudheden, Leiden, Holland; I. R. Accademia degli Agiati, Rovereto, Austria; Verein der Freunde der Naturgeschichte in Mecklenburg, Güstrow; Société Vaudoise des Sciences Naturelles, Lausanne, Switzerland; Naturwissenschaftliche Gesellschaft, St. Gall, Switzerland; M. J. de Rey-Pailhade, Toulouse, France; Philosophical Society, Cambridge, Eng.; Mr. James Lindsay, Kilmarnock, Scotland; R. Society of Antiquaries of Ireland, Dublin; American Antiquarian Society, Worcester, Mass.; Connecticut Historical Society, Hartford; Lenox Library, New York, N. Y.; University of Michigan, Ann Arbor; Agricultural Experiment Stations, Durham, N. H., Burlington, Vt., Jacksonville, Fla., Tucson, Ariz.; Observatorio Meteorológico Central, Mexico.

Dr. William H. Greene presented to the Society a Breguet metallic thermometer, made by Dr. Franklin Bache, from whom it was purchased by Dr. B. Howard Rand, whose widow

presented it to the donor. This form is no longer made, except as an apparatus for physical demonstration. It was the precursor of the modern metallic thermometer now rapidly coming into use.

An obituary notice of the late James E. Rhoads, M.D., LL.D., was read by Dr. Henry Hartshorne.

The President announced the death of Hamilton Andrews Hill, Boston, Mass., April 27, 1895, æt. 67.

Prof. Cope read his paper on "Some New Forms of Whalebone Whales," as announced.

Mr. Julius F. Sachse made a preliminary communication on "The Application of Electricity to Photography."

Pending nominations 1306–1316 and new nominations 1317–1329 were read.

The following report of the Special Committee on Mr. Lyman's paper was presented:

TO THE AMERICAN PHILOSOPHICAL SOCIETY:

The Special Committee to whom was referred the paper by Mr. Benjamin S. Lyman read at a late meeting of the Society, for the purpose of considering the subject of publishing the plates accompanying the said paper, respectfully report that they have carefully considered the matter referred to them and have reached the following conclusions upon the subject:

1. The plates consist of thirty-four maps taken bodily from the book of plans published by the Geological Survey of Pennsylvania, all of which have been copyrighted under the Laws of the United States and therefore under no circumstances can be published without the written consent of the Board of Survey, witnessed by two or more witnesses, which consent does not accompany the papers.

2. There is a standing rule of the Society from which it has not deviated, that all its publications must be of original matter, and any papers, drawings or maps, which have been previously printed or published, cannot appear in its Proceedings or Transactions. This is an insuperable objection, and however much we personally desire to accommodate Mr. Lyman, it is impossible for us, even if the expense should be borne by him, to report in favor of printing or publishing the maps, although he is fully entitled, to have his paper printed in the *Proceedings* as an original contribution read at one of the stated meetings. We therefore submit the following resolutions for adoption by the Society:

"*Resolved*, That the paper presented by Mr. Benjamin S Lyman be published in our *Proceedings*, but that for the reasons set forth in the report

of the Committee, the thirty-four maps accompanying his paper be not included in the publication."

"*Resolved*, That the Special Committee be discharged from the further consideration of the matter."

WILLIAM H. GREENE,
J. SERGEANT PRICE,
ALBERT H. SMYTH.

Prof. Greene made a statement in reference to the paper of Mr. Lyman, expressing his inability to speak of its special value as a geological contribution.

Mr. Lyman stated that he had received a verbal permission to print the copyrighted maps.

Prof. Cope spoke in favor of publishing the maps accompanying Mr. Lyman's paper.

Mr. J. Sergeant Price explained the reason for referring the question of publication to a Committee.

Prof. Cope moved that the Special Committee be discharged, and that a Committee of Experts be appointed to consider the publication of the plates and the paper. Carried.

The President subsequently appointed Messrs. Heilprin, Ingham and Platt.

And the Society was adjourned by the President.